

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 22 Mar 2024 18:29:04

Project Information			
Assessed By	Nikki Kells	Building Type	House, Detached
OCDEA Registration	EES/022714	Assessment Date	2024-03-22

Dwelling Details			
Assessment Type	As designed	Total Floor Area	202 m ²
Site Reference	9 Longmead	Plot Reference	2687N
Address	9 Longmead, Guildford, GU1 2HN		

Client Details	
Name	Owner
Company	Owner
Address	Owner, Owner, Owner

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	8.47 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	3.83 kgCO ₂ /m ²	OK	
1b Target primary energy rate and dwelling primary energy			
Target primary energy	44.97 kWh _{PE} /m ²		
Dwelling primary energy	39.77 kWh _{PE} /m ²	OK	
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	44.1 kWh/m ²		
Dwelling fabric energy efficiency	44.0 kWh/m ²	OK	

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.17	Walls (1) (0.18)	OK
Party walls	0.2	N/A	N/A	N/A
Curtain walls	1.6	N/A	N/A	N/A
Floors	0.18	0.16	New Ground (0.16)	OK
Roofs	0.16	0.08	Roof (2) (0.16)	OK
Windows, doors, and roof windows	1.6	1.4	W Door (1.4)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	81.58	0.18
Exposed wall: Walls (2)	91.78	0.17
Ground floor: New Ground, New Ground	118.27	0.16
Exposed roof: Roof (1)	83.69	0.07 (!)
Exposed roof: Roof (2)	18.58	0.16
Exposed roof: Roof (3)	14.04	0.07 (!)

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
W Door, Half Glazed Door	4.2	West	N/A	1.4
W Brick, 1.4 Windows	3.92	West	0.7	1.4
W Brick, 1.4 Windows	2.34	West	0.7	1.4
W Rend, 1.4 Windows	1.5	West	0.7	1.4
W Rend, 1.4 Windows	2.375	West	0.7	1.4
W Rend, 1.4 Windows	2.375	West	0.7	1.4
N Brick, 1.4 Windows	1.04	North	0.7	1.4
N Brick, 1.4 Windows	0.32	North	0.7	1.4
N Door, Half Glazed Door	1.89	North	N/A	1.4
S Brick, 1.4 Windows	1.04	South	0.7	1.4
S Brick, 1.4 Windows	1.04	South	0.7	1.4

Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
S Brick, 1.4 Windows	1.43	South	0.7	1.4
S Brick, 1.4 Windows	1.54	South	0.7	1.4
S Rend, 1.4 Windows	0.875	South	0.7	1.4
E Brick, 1.4 Windows	16.56	East	0.7	1.4
E Rend, 1.4 Windows	1.125	East	0.7	1.4
E Rend, 1.4 Windows	2.5	East	0.7	1.4
E Rend, 1.4 Windows	2.5	East	0.7	1.4
GF Lantern, Lantern	1.96	Horizontal	0.7	1.4

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))

Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E1: Steel lintel with perforated steel base plate	Calculated by person with suitable expertise	0.17	
External wall	E3: Sill	Calculated by person with suitable expertise	0.02 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.015 (!)	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.049	
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0.001 (!)	
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0.056	
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.036 (!)	
External wall	E15: Flat roof with parapet	SAP table default	0.3	
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.038 (!)	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.074	
Roof	R1: Head of roof window	SAP table default	0.24	
Roof	R2: Sill of roof window	SAP table default	0.24	
Roof	R3: Jamb of roof window	SAP table default	0.24	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))

Maximum permitted air permeability at 50Pa	8 m ³ /hm ²	
Dwelling air permeability at 50Pa	5 m ³ /hm ² , Design value	OK
Air permeability test certificate reference		

4 Space heating

Main heating system 1: Heat pump with radiators or underfloor heating - Electricity

Efficiency	249.9%
Emitter type	Radiators
Flow temperature	35°C
System type	Air source heat pump
Manufacturer	
Model	
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water

Cylinder/store - type: Cylinder

Capacity	250 litres
Declared heat loss	N/A
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	

Waste water heat recovery system 1 - type: N/A		
Efficiency		
Manufacturer		
Model		
6 Controls		
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services		
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		
7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	75 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Full SAP Calculation Printout



Property Reference	9 Longmead		Issued on Date	22/03/2024	
Assessment Reference	2687N	Prop Type Ref			
Property	9, Longmead, Guildford, GU1 2HN				
SAP Rating	80 C	DER	3.83	TER	8.47
Environmental	96 A	% DER < TER	54.78		
CO ₂ Emissions (t/year)	0.71	DFEE	44.04	TFEE	44.12
Compliance Check	See BREL	% DFEE < TFEE	0.16		
% DPER < TPER	11.56	DPER	39.77	TPER	44.97
Assessor Details	Mrs. Nikki Kells			Assessor ID	L822-0001
Client	Owner, Owner				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	118.2700 (1b)	x 2.5000 (2b)	= 295.6750 (1b) - (3b)
First floor	83.6900 (1c)	x 2.7000 (2c)	= 225.9630 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	201.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	521.6380 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0767 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3267 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2777 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3540	0.3471	0.3402	0.3054	0.2985	0.2638	0.2638	0.2569	0.2777	0.2985	0.3124	0.3263 (22b)
Effective ac	0.5627	0.5602	0.5579	0.5466	0.5446	0.5348	0.5348	0.5330	0.5386	0.5446	0.5488	0.5532 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Half Glazed Door			6.0900	1.4000	8.5260		(26a)
1.4 Windows (Uw = 1.40)			42.4900	1.3258	56.3314		(27)
GF Lantern			1.9600	1.3258	2.5985		(27a)
New Ground			118.2700	0.1600	18.9232	110.0000	13009.7000 (28a)
External Brick	116.9000	35.3200	81.5800	0.1800	14.6844	60.0000	4894.8000 (29a)
External Rendered	105.0300	13.2600	91.7700	0.1700	15.6009	60.0000	5506.2000 (29a)
FF Plane	83.6900		83.6900	0.0700	5.8583	9.0000	753.2100 (30)
GF Flat	20.5400	1.9600	18.5800	0.1600	2.9728	9.0000	167.2200 (30)
GF Plane	14.0400		14.0400	0.0700	0.9828	9.0000	126.3600 (30)
Total net area of external elements Aum(A, m ²)			458.4700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	126.4783	(33)
Internal Wall			304.8000			9.0000	2743.2000 (32c)
FF Internal			83.6900			18.0000	1506.4200 (32d)
GF Internal			83.6900			9.0000	753.2100 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 29460.3200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							145.8721 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E1 Steel lintel with perforated steel base plate	28.3500	0.1700	4.8195
E3 Sill	25.4500	0.0200	0.5090
E4 Jamb	56.5000	0.0150	0.8475
E5 Ground floor (normal)	46.7600	0.0490	2.2912
E6 Intermediate floor within a dwelling	38.9000	0.0010	0.0389
E10 Eaves (insulation at ceiling level)	44.6600	0.0560	2.5010
E12 Gable (insulation at ceiling level)	4.5000	0.0360	0.1620
E15 Flat roof with parapet	16.4900	0.3000	4.9470
E16 Corner (normal)	33.7000	0.0380	1.2806
E17 Corner (inverted - internal area greater than external area)	12.9000	-0.0740	-0.9546
R1 Head of roof window	0.8000	0.2400	0.1920
R2 Sill of roof window	0.8000	0.2400	0.1920
R3 Jamb of roof window	4.9000	0.2400	1.1760
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			18.0021 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss			(33) + (36) + (36a) = 144.4804 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	96.8588	96.4398	96.0292	94.1005	93.7396	92.0597	92.0597	91.7486	92.7068	93.7396	94.4696	95.2328	(38)
Average = Sum(39)m / 12 =	241.3392	240.9203	240.5096	238.5809	238.2200	236.5402	236.5402	236.2291	237.1872	238.2200	238.9500	239.7132	(39)
												238.5792	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1950	1.1929	1.1909	1.1813	1.1795	1.1712	1.1712	1.1697	1.1744	1.1795	1.1832	1.1869	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												1.1813	
												31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													3.0045 (42)
Hot water usage for mixer showers	74.5950	73.4739	71.8404	68.7149	66.4084	63.8362	62.3741	63.9953	65.7724	68.5342	71.7268	74.3091	(42a)
Hot water usage for baths	32.2015	31.7233	31.0498	29.8081	28.8783	27.8473	27.2904	27.9591	28.6873	29.7905	31.0578	32.0926	(42b)
Hot water usage for other uses	45.3988	43.7479	42.0971	40.4462	38.7953	37.1445	37.1445	38.7953	40.4462	42.0971	43.7479	45.3988	(42c)
Average daily hot water use (litres/day)													139.9015 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	152.1952	148.9451	144.9872	138.9692	134.0820	128.8279	126.8089	130.7497	134.9058	140.4217	146.5325	151.8006	(44)
Energy content (annual)	241.0400	212.0958	222.8400	190.2418	180.5001	158.4089	153.3644	161.8955	166.3524	190.5509	208.7624	237.6830	(45)
Distribution loss (46)m = 0.15 x (45)m	36.1560	31.8144	33.4260	28.5363	27.0750	23.7613	23.0047	24.2843	24.9529	28.5826	31.3144	35.6524	(46)
Water storage loss:													250.0000 (47)
Store volume													
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)													0.0103 (51)
Volume factor from Table 2a													0.7830 (52)
Temperature factor from Table 2b													0.5400 (53)
Enter (49) or (54) in (55)													1.0875 (55)
Total storage loss	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127	(56)
If cylinder contains dedicated solar storage	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	298.0151	263.5572	279.8150	245.3790	237.4751	213.5461	210.3395	218.8705	221.4895	247.5260	263.8995	294.6580	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	298.0151	263.5572	279.8150	245.3790	237.4751	213.5461	210.3395	218.8705	221.4895	247.5260	263.8995	294.6580	(64)
Total per year (kWh/year)													2994.5706 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	125.7259	111.6909	119.6743	107.3651	105.5963	96.7807	96.5737	99.4103	99.4219	108.9382	113.5232	124.6096	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	188.1033	208.2572	188.1033	194.3734	188.1033	194.3734	188.1033	188.1033	194.3734	188.1033	194.3734	188.1033	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	372.9043	376.7739	367.0226	346.2635	320.0587	295.4300	278.9764	275.1068	284.8581	305.6172	331.8220	356.4507	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	(71)
Water heating gains (Table 5)	168.9864	166.2068	160.8526	149.1182	141.9305	134.4176	129.8034	133.6160	138.0860	146.4223	157.6711	167.4861	(72)
Total internal gains	801.0610	822.3049	787.0456	760.8221	721.1596	692.2880	664.9501	664.8932	685.3845	711.2099	754.9336	783.1072	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m2	Table 6a	Specific data	Specific data	factor	W
		W/m2	or Table 6b	or Table 6c	Table 6d	

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North	1.3600	10.6334	0.6300	0.7000	0.7700	4.4196 (74)
East	22.6900	19.6403	0.6300	0.7700	0.7700	136.1926 (76)
South	5.9300	46.7521	0.6300	0.7000	0.7700	84.7281 (78)
West	12.5100	19.6403	0.6300	0.7000	0.7700	75.0890 (80)
Horizontal	1.9600	26.0000	0.6300	0.7000	1.0000	20.2260 (82)

Solar gains	320.6554	602.5285	946.4574	1332.2279	1605.1985	1634.5838	1559.4955	1355.3404	1083.0050	701.4948	394.9987	266.9814 (83)
Total gains	1121.7163	1424.8333	1733.5030	2093.0500	2326.3581	2326.8718	2224.4456	2020.2335	1768.3894	1412.7047	1149.9323	1050.0886 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	33.9084	33.9673	34.0253	34.3004	34.3524	34.5963	34.5963	34.6419	34.5020	34.3524	34.2474	34.1384
alpha	3.2606	3.2645	3.2684	3.2867	3.2902	3.3064	3.3064	3.3095	3.3001	3.2902	3.2832	3.2759
util living area	0.9888	0.9756	0.9461	0.8722	0.7478	0.5855	0.4469	0.5036	0.7369	0.9256	0.9797	0.9909 (86)
MIT	18.7162	19.0532	19.5541	20.1673	20.6265	20.8808	20.9632	20.9455	20.7378	20.0816	19.2786	18.6600 (87)
Th 2	19.9240	19.9257	19.9273	19.9350	19.9364	19.9431	19.9431	19.9443	19.9405	19.9364	19.9335	19.9305 (88)
util rest of house	0.9864	0.9706	0.9348	0.8459	0.6979	0.5076	0.3479	0.4010	0.6667	0.9044	0.9747	0.9890 (89)
MIT 2	17.2513	17.6802	18.3114	19.0669	19.5955	19.8596	19.9261	19.9169	19.7325	18.9830	17.9753	17.1835 (90)
Living area fraction												0.0958 (91)
MIT	17.3916	17.8116	18.4304	19.1722	19.6942	19.9574	20.0254	20.0154	19.8287	19.0882	18.1001	17.3249 (92)
Temperature adjustment												0.0000
adjusted MIT	17.3916	17.8116	18.4304	19.1722	19.6942	19.9574	20.0254	20.0154	19.8287	19.0882	18.1001	17.3249 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	1096.6939	1362.2292	1583.9251	1723.0022	1594.1037	1183.7599	791.7326	824.8042	1164.1899	1246.1029	1105.7936	1030.6938 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	3159.5154	3110.6778	2869.3876	2450.7581	1904.3804	1267.2353	810.2391	854.0559	1358.7812	2022.0530	2628.4742	3146.2198 (97)
Space heating kWh	1534.7392	1174.9574	956.3841	523.9843	230.8459	0.0000	0.0000	0.0000	0.0000	577.3069	1096.3300	1573.9514 (98a)
Space heating requirement - total per year (kWh/year)												7668.4991
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1534.7392	1174.9574	956.3841	523.9843	230.8459	0.0000	0.0000	0.0000	0.0000	577.3069	1096.3300	1573.9514 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7668.4991
Space heating per m2												(98c) / (4) = 37.9704 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												249.9000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1534.7392	1174.9574	956.3841	523.9843	230.8459	0.0000	0.0000	0.0000	0.0000	577.3069	1096.3300	1573.9514 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)	614.1413	470.1710	382.7067	209.6776	92.3753	0.0000	0.0000	0.0000	0.0000	231.0152	438.7075	629.8325 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	298.0151	263.5572	279.8150	245.3790	237.4751	213.5461	210.3395	218.8705	221.4895	247.5260	263.8995	294.6580 (64)
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000 (216)
Fuel for water heating, kWh/month	170.1971	150.5181	159.8030	140.1365	135.6226	121.9566	120.1253	124.9974	126.4932	141.3626	150.7136	168.2799 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	48.3819	38.8137	34.9475	25.6040	19.7773	16.1582	18.0415	23.4510	30.4605	39.9659	45.1414	49.7265 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												3068.6271 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

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Efficiency of water heater	175.1000
Water heating fuel used	1710.2059 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	390.4694 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	5169.3024 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3068.6271	0.1552	476.3895 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1710.2059	0.1409	241.0299 (264)
Space and water heating			717.4194 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	390.4694	0.1443	56.3568 (268)
Total CO2, kg/year			773.7762 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.8300 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3068.6271	1.5747	4832.2941 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1710.2059	1.5211	2601.4501 (278)
Space and water heating			7433.7442 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	390.4694	1.5338	598.9150 (282)
Total Primary energy kWh/year			8032.6592 (286)
Dwelling Primary energy Rate (DPER)			39.7700 (287)

 SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
 CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

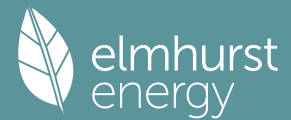
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	118.2700 (1b)	x 2.5000 (2b)	= 295.6750 (1b) - (3b)
First floor	83.6900 (1c)	x 2.7000 (2c)	= 225.9630 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	201.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	521.6380 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0767 (8)
Pressure Test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3267 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2777 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3540	0.3471	0.3402	0.3054	0.2985	0.2638	0.2638	0.2569	0.2777	0.2985	0.3124	0.3263 (22b)
Effective ac	0.5627	0.5602	0.5579	0.5466	0.5446	0.5348	0.5348	0.5330	0.5386	0.5446	0.5488	0.5532 (25)

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Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788 (71)
Water heating gains (Table 5)	166.7624	163.9828	158.6287	146.8943	139.7066	132.1937	127.5794	131.3920	135.8620	144.1984	155.4472	165.2621	165.2621 (72)
Total internal gains	798.8380	820.0820	784.8226	758.5992	718.9366	690.0651	662.7272	662.6702	683.1616	708.9870	752.7107	780.8842	780.8842 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
North	1.3600	10.6334	0.6300	0.7000	0.7700	4.4196 (74)							
East	22.6700	19.6403	0.6300	0.7000	0.7700	136.0726 (76)							
South	5.9300	46.7521	0.6300	0.7000	0.7700	84.7281 (78)							
West	12.5200	19.6403	0.6300	0.7000	0.7700	75.1490 (80)							
Horizontal	1.9600	26.0000	0.6300	0.7000	1.0000	20.2260 (82)							
Solar gains	320.5953	602.4110	946.2640	1331.9458	1604.8529	1634.2300	1559.1586	1355.0510	1082.7801	701.3555	394.9238	266.9320	266.9320 (83)
Total gains	1119.4334	1422.4931	1731.0866	2090.5450	2323.7895	2324.2951	2221.8858	2017.7212	1765.9416	1410.3424	1147.6345	1047.8163	1047.8163 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	33.8661	33.9249	33.9828	34.2572	34.3090	34.5523	34.5523	34.5978	34.4582	34.3090	34.2043	34.0955	
alpha	3.2577	3.2617	3.2655	3.2838	3.2873	3.3035	3.3035	3.3065	3.2972	3.2873	3.2803	3.2730	
util living area	0.9889	0.9757	0.9463	0.8727	0.7486	0.5864	0.4478	0.5046	0.7378	0.9260	0.9798	0.9910	0.9910 (86)
MIT	18.7115	19.0485	19.5498	20.1639	20.6244	20.8799	20.9629	20.9450	20.7362	20.0782	19.2744	18.6553	18.6553 (87)
Th 2	19.9228	19.9245	19.9261	19.9338	19.9352	19.9419	19.9419	19.9431	19.9393	19.9352	19.9323	19.9293	19.9293 (88)
util rest of house	0.9865	0.9707	0.9351	0.8465	0.6987	0.5084	0.3486	0.4017	0.6677	0.9049	0.9748	0.9891	0.9891 (89)
MIT 2	17.2446	17.6735	18.3053	19.0620	19.5923	19.8577	19.9247	19.9154	19.7299	18.9781	17.9692	17.1768	17.1768 (90)
Living area fraction	FLA = Living area / (4) =											0.0958 (91)	
MIT	17.3851	17.8052	18.4245	19.1675	19.6911	19.9556	20.0241	20.0140	19.8262	19.0835	18.0942	17.3184	17.3184 (92)
Temperature adjustment												0.0000	
adjusted MIT	17.3851	17.8052	18.4245	19.1675	19.6911	19.9556	20.0241	20.0140	19.8262	19.0835	18.0942	17.3184	17.3184 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9778	0.9562	0.9140	0.8237	0.6859	0.5095	0.3566	0.4090	0.6592	0.8825	0.9618	0.9816	0.9816 (94)
Useful gains	1094.5799	1360.2338	1582.2143	1721.9768	1593.9989	1184.2943	792.2860	825.3003	1164.0626	1244.6477	1103.7913	1028.5610	1028.5610 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	4.2000 (96)
Heat loss rate W	3161.8800	3113.0152	2871.5544	2452.7195	1906.0495	1268.4302	810.9717	854.8236	1359.9136	2023.4853	2630.3720	3148.5981	3148.5981 (97)
Space heating kWh	1538.0713	1177.8691	959.2690	526.1348	232.1656	0.0000	0.0000	0.0000	0.0000	579.4552	1099.1381	1577.3076	1577.3076 (98a)
Space heating requirement - total per year (kWh/year)												7689.4108	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1538.0713	1177.8691	959.2690	526.1348	232.1656	0.0000	0.0000	0.0000	0.0000	579.4552	1099.1381	1577.3076	1577.3076 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7689.4108	
Space heating per m2												(98c) / (4) = 38.0739 (99)	

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)	
Fraction of space heat from main system(s)												1.0000 (202)	
Efficiency of main space heating system 1 (in %)												92.3000 (206)	
Efficiency of main space heating system 2 (in %)												0.0000 (207)	
Efficiency of secondary/supplementary heating system, %												0.0000 (208)	
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1538.0713	1177.8691	959.2690	526.1348	232.1656	0.0000	0.0000	0.0000	0.0000	0.0000	579.4552	1099.1381	1577.3076	1577.3076 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	1666.3828	1276.1312	1039.2947	570.0269	251.5337	0.0000	0.0000	0.0000	0.0000	627.7954	1190.8322	1708.8923	1708.8923 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating													
Water heating requirement	261.8451	231.5293	246.1652	217.2266	211.0352	190.6895	188.7230	196.0147	197.9106	220.0204	233.0806	259.1196	259.1196 (64)
Efficiency of water heater (217)m	87.3666	87.1847	86.8008	85.9668	84.2743	79.8000	79.8000	79.8000	79.8000	86.1268	87.0817	87.4090	87.4090 (216)
Fuel for water heating, kWh/month	299.7086	265.5618	283.5976	252.6867	250.4148	238.9593	236.4950	245.6324	248.0083	255.4611	267.6573	296.4449	296.4449 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041 (231)
Lighting	39.0844	31.3549	28.2316	20.6837	15.9767	13.0531	14.5745	18.9444	24.6070	32.2857	36.4666	40.1706	40.1706 (232)

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Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-94.0438	-124.9508	-169.3095	-178.9765	-183.7250	-168.0242	-165.6205	-160.5220	-150.7108	-136.8587	-100.4830	-82.2014	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-79.1268	-162.5689	-316.3533	-465.8350	-607.4238	-607.5115	-600.6376	-512.6449	-381.1002	-229.6218	-104.6394	-62.9017	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												8330.8893	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												3140.6279	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												315.4331	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-5845.7911	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												6027.1592	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	8330.8893	0.2100	1749.4868 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3140.6279	0.2100	659.5319 (264)
Space and water heating			2409.0186 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	315.4331	0.1443	45.5267 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1715.4262	0.1359	-233.1675
PV Unit electricity exported	-4130.3649	0.1265	-522.4046
Total			-755.5720 (269)
Total CO2, kg/year			1710.9026 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.4700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	8330.8893	1.1300	9413.9049 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3140.6279	1.1300	3548.9095 (278)
Space and water heating			12962.8144 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	315.4331	1.5338	483.8218 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1715.4262	1.5024	-2577.2995
PV Unit electricity exported	-4130.3649	0.4643	-1917.6875
Total			-4494.9870 (283)
Total Primary energy kWh/year			9081.7501 (286)
Target Primary Energy Rate (TPER)			44.9700 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	118.2700 (1b)	x 2.5000 (2b)	= 295.6750 (1b) - (3b)
First floor	83.6900 (1c)	x 2.7000 (2c)	= 225.9630 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	201.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 521.6380 (5)

2. Ventilation rate

m3 per hour

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Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

Air changes per hour

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0767 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0000 (17)
Infiltration rate			0.3267 (18)
Number of sides sheltered			2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.2777 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3540	0.3471	0.3402	0.3054	0.2985	0.2638	0.2638	0.2569	0.2777	0.2985	0.3124	0.3263	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5627	0.5602	0.5579	0.5466	0.5446	0.5348	0.5348	0.5330	0.5386	0.5446	0.5488	0.5532	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Half Glazed Door			6.0900	1.4000	8.5260			(26a)
1.4 Windows (Uw = 1.40)			42.4900	1.3258	56.3314			(27)
GF Lantern			1.9600	1.3258	2.5985			(27a)
New Ground			118.2700	0.1600	18.9232	110.0000	13009.7000	(28a)
External Brick	116.9000	35.3200	81.5800	0.1800	14.6844	60.0000	4894.8000	(29a)
External Rendered	105.0300	13.2600	91.7700	0.1700	15.6009	60.0000	5506.2000	(29a)
FF Plane	83.6900		83.6900	0.0700	5.8583	9.0000	753.2100	(30)
GF Flat	20.5400	1.9600	18.5800	0.1600	2.9728	9.0000	167.2200	(30)
GF Plane	14.0400		14.0400	0.0700	0.9828	9.0000	126.3600	(30)
Total net area of external elements Aum(A, m2)			458.4700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	126.4783			(33)
Internal Wall			304.8000			9.0000	2743.2000	(32c)
FF Internal			83.6900			18.0000	1506.4200	(32d)
GF Internal			83.6900			9.0000	753.2100	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 29460.3200 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 145.8721 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	28.3500	0.1700	4.8195
E3 Sill	25.4500	0.0200	0.5090
E4 Jamb	56.5000	0.0150	0.8475
E5 Ground floor (normal)	46.7600	0.0490	2.2912
E6 Intermediate floor within a dwelling	38.9000	0.0010	0.0389
E10 Eaves (insulation at ceiling level)	44.6600	0.0560	2.5010
E12 Gable (insulation at ceiling level)	4.5000	0.0360	0.1620
E15 Flat roof with parapet	16.4900	0.3000	4.9470
E16 Corner (normal)	33.7000	0.0380	1.2806
E17 Corner (inverted - internal area greater than external area)	12.9000	-0.0740	-0.9546
R1 Head of roof window	0.8000	0.2400	0.1920
R2 Sill of roof window	0.8000	0.2400	0.1920
R3 Jamb of roof window	4.9000	0.2400	1.1760

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 18.0021 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 144.4804 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

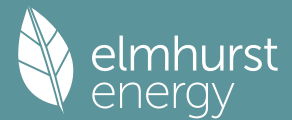
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	96.8588	96.4398	96.0292	94.1005	93.7396	92.0597	92.0597	91.7486	92.7068	93.7396	94.4696	95.2328	(38)
Average = Sum(39)m / 12 =	241.3392	240.9203	240.5096	238.5809	238.2200	236.5402	236.5402	236.2291	237.1872	238.2200	238.9500	239.7132	(39)
												238.5792	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1950	1.1929	1.1909	1.1813	1.1795	1.1712	1.1712	1.1697	1.1744	1.1795	1.1832	1.1869	(40)
HLP (average)												1.1813	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													3.0045 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	32.2015	31.7233	31.0498	29.8081	28.8783	27.8473	27.2904	27.9591	28.6873	29.7905	31.0578	32.0926	(42b)
Hot water usage for other uses	45.3998	43.7479	42.0971	40.4462	38.7953	37.1445	37.1445	38.7953	40.4462	42.0971	43.7479	45.3988	(42c)
Average daily hot water use (litres/day)													71.1275 (43)
Daily hot water use	77.6003	75.4712	73.1468	70.2542	67.6736	64.9917	64.4348	66.7544	69.1334	71.8875	74.8057	77.4914	(44)
Energy conte	122.8999	107.4699	112.4240	96.1746	91.1017	79.9149	77.9283	82.6559	85.2485	97.5507	106.5744	121.3328	(45)
Energy content (annual)													Total = Sum(45)m = 1181.2755
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

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If cylinder contains dedicated solar storage											
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	104.4649	91.3494	95.5604	81.7484	77.4364	67.9277	66.2391	70.2575	72.4612	82.9181	90.5883 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	104.4649	91.3494	95.5604	81.7484	77.4364	67.9277	66.2391	70.2575	72.4612	82.9181	90.5883 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =										1004.0842 (64)
Electric shower(s)	59.7381	53.2272	58.1220	55.4651	56.5059	53.9012	55.6979	56.5059	55.4651	58.1220	57.0291 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =										679.5177 (64a)	
Heat gains from water heating, kWh/month	41.0508	36.1442	38.4206	34.3034	33.4856	30.4572	30.4842	31.6909	31.9816	35.2600	36.9043 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	188.1033	208.2572	188.1033	194.3734	188.1033	194.3734	188.1033	188.1033	194.3734	188.1033	194.3734	188.1033 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	372.9043	376.7739	367.0226	346.2635	320.0587	295.4300	278.9764	275.1068	284.8581	305.6172	331.8220	356.4507 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788 (71)
Water heating gains (Table 5)	55.1757	53.7859	51.6406	47.6436	45.0075	42.3017	40.9734	42.5953	44.4189	47.3925	51.2560	54.7282 (72)
Total internal gains	684.2504	706.8841	674.8336	656.3475	621.2366	600.1721	576.1202	573.8724	591.7174	609.1801	645.5185	667.3493 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
North	1.3600	10.6334	0.6300	0.7000	0.7700	4.4196 (74)						
East	22.6900	19.6403	0.6300	0.7000	0.7700	136.1926 (76)						
South	5.9300	46.7521	0.6300	0.7000	0.7700	84.7281 (78)						
West	12.5100	19.6403	0.6300	0.7000	0.7700	75.0890 (80)						
Horizontal	1.9600	26.0000	0.6300	0.7000	1.0000	20.2260 (82)						
Solar gains	320.6554	602.5285	946.4574	1332.2279	1605.1985	1634.5838	1559.4955	1355.3404	1083.0050	701.4948	394.9987	266.9814 (83)
Total gains	1004.9057	1309.4125	1621.2909	1988.5753	2226.4351	2234.7559	2135.6157	1929.2128	1674.7223	1310.6749	1040.5172	934.3307 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	33.9084	33.9673	34.0253	34.3004	34.3524	34.5963	34.5963	34.6419	34.5020	34.3524	34.2474	34.1384
alpha	3.2606	3.2645	3.2684	3.2867	3.2902	3.3064	3.3064	3.3095	3.3001	3.2902	3.2832	3.2759
util living area	0.9919	0.9807	0.9545	0.8854	0.7650	0.6033	0.4630	0.5231	0.7585	0.9380	0.9847	0.9936 (86)
MIT	18.6283	18.9703	19.4817	20.1164	20.5979	20.8696	20.9592	20.9390	20.7121	20.0202	19.1986	18.5721 (87)
Th 2	19.9240	19.9257	19.9273	19.9350	19.9364	19.9431	19.9431	19.9443	19.9405	19.9364	19.9335	19.9305 (88)
util rest of house	0.9901	0.9766	0.9447	0.8610	0.7163	0.5247	0.3614	0.4181	0.6901	0.9196	0.9808	0.9922 (89)
MIT 2	17.7540	18.0943	18.5985	19.2125	19.6481	19.8713	19.9282	19.9201	19.7601	19.1366	18.3288	17.7024 (90)
Living area fraction	17.8377	18.1782	18.6831	19.2991	19.7391	19.9669	20.0269	20.0177	19.8513	19.2212	18.4121	17.7857 (92)
MIT	17.8377	18.1782	18.6831	19.2991	19.7391	19.9669	20.0269	20.0177	19.8513	19.2212	18.4121	17.7857 (92)
Temperature adjustment												0.0000
adjusted MIT	17.8377	18.1782	18.6831	19.2991	19.7391	19.9669	20.0269	20.0177	19.8513	19.2212	18.4121	17.7857 (93)

8. Space heating requirement

Utilisation	0.9851	0.9673	0.9298	0.8434	0.7062	0.5266	0.3698	0.4258	0.6836	0.9034	0.9728	0.9880 (94)
Useful gains	989.9156	1266.5824	1507.5292	1677.2321	1572.3331	1176.8509	789.8497	821.4464	1144.7737	1184.0332	1012.1838	923.1282 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	3267.1769	3198.9856	2930.1563	2481.0259	1915.0679	1269.4874	810.6088	854.6016	1364.1262	2053.7374	2703.0322	3256.6672 (97)
Space heating kWh	1694.2824	1298.5750	1058.4346	578.7315	254.9947	0.0000	0.0000	0.0000	0.0000	647.0599	1217.4108	1736.1531 (98a)
Space heating requirement - total per year (kWh/year)												8485.6419
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1694.2824	1298.5750	1058.4346	578.7315	254.9947	0.0000	0.0000	0.0000	0.0000	647.0599	1217.4108	1736.1531 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												8485.6419
Space heating per m2												(98c) / (4) = 42.0164 (99)

8c. Space cooling requirement

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Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	2223.4774	1750.3971	1795.3409	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8106	0.8705	0.8327	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1802.3928	1523.7368	1495.0246	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	502.3534	643.9230	491.7532	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	125.5883	160.9807	122.9383	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												409.5074 (107)
Energy for space heating												42.0164 (99)
Energy for space cooling												2.0277 (108)
Total												44.0441 (109)
Fabric Energy Efficiency (DFEE)												44.0 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	118.2700 (1b)	x 2.5000 (2b)	= 295.6750 (1b) - (3b)
First floor	83.6900 (1c)	x 2.7000 (2c)	= 225.9630 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	201.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	521.6380 (5)

2. Ventilation rate

		Air changes per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0767 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3267	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2777 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3540	0.3471	0.3402	0.3054	0.2985	0.2638	0.2638	0.2569	0.2777	0.2985	0.3124	0.3263 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5627	0.5602	0.5579	0.5466	0.5446	0.5348	0.5348	0.5330	0.5386	0.5446	0.5488	0.5532 (25)

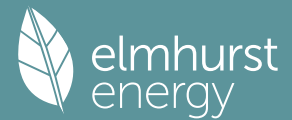
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Semi-glazed door			6.0900	1.0000	6.0900		(26a)
TER Opening Type (Uw = 1.20)			42.4800	1.1450	48.6412		(27)
GF Lantern			1.9600	1.5918	3.1199		(27a)
New Ground			118.2700	0.1300	15.3751		(28a)
External Brick	116.9000	35.3000	81.6000	0.1800	14.6880		(29a)
External Rendered	105.0300	13.2700	91.7600	0.1800	16.5168		(29a)
FF Plane	83.6900		83.6900	0.1100	9.2059		(30)
GF Flat	20.5400	1.9600	18.5800	0.1100	2.0438		(30)
GF Plane	14.0400		14.0400	0.1100	1.5444		(30)
Total net area of external elements Aum(A, m ²)			458.4700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	117.2251	(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	28.3500	0.0500	1.4175
E3 Sill	25.4500	0.0500	1.2725
E4 Jamb	56.5000	0.0500	2.8250
E5 Ground floor (normal)	46.7600	0.1600	7.4816

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E6 Intermediate floor within a dwelling	38.9000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	44.6600	0.0600	2.6796
E12 Gable (insulation at ceiling level)	4.5000	0.0600	0.2700
E15 Flat roof with parapet	16.4900	0.5600	9.2344
E16 Corner (normal)	33.7000	0.0900	3.0330
E17 Corner (inverted - internal area greater than external area)	12.9000	-0.0900	-1.1610
R1 Head of roof window	0.8000	0.0800	0.0640
R2 Sill of roof window	0.8000	0.0600	0.0480
R3 Jamb of roof window	4.9000	0.0800	0.3920

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal bridges (36a) = 27.5566 (36)
 Total fabric heat loss (33) + (36) + (36a) = 144.7817 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	96.8588	96.4398	96.0292	94.1005	93.7396	92.0597	92.0597	91.7486	92.7068	93.7396	94.4696	95.2328 (38)
Average = Sum(39)m / 12 =	241.6404	241.2215	240.8109	238.8821	238.5213	236.8414	236.8414	236.5303	237.4885	238.5213	239.2513	240.0145 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1965	1.1944	1.1924	1.1828	1.1810	1.1727	1.1727	1.1712	1.1759	1.1810	1.1846	1.1884 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42)
Hot water usage for baths	32.2015	31.7233	31.0498	29.8081	28.8783	27.8473	27.2904	27.9591	28.6873	29.7905	31.0578	32.0926 (42b)
Hot water usage for other uses	45.3988	43.7479	42.0971	40.4462	38.7953	37.1445	37.1445	38.7953	40.4462	42.0971	43.7479	45.3988 (42c)
Average daily hot water use (litres/day)	45.3988	43.7479	42.0971	40.4462	38.7953	37.1445	37.1445	38.7953	40.4462	42.0971	43.7479	45.3988 (43)
Daily hot water use	77.6003	75.4712	73.1468	70.2542	67.6736	64.9917	64.4348	66.7544	69.1334	71.8875	74.8057	77.4914 (44)
Energy content (annual)	122.8999	107.4699	112.4240	96.1746	91.1017	79.9149	77.9283	82.6559	85.2485	97.5507	106.5744	121.3328 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (62)
Total heat required for water heating calculated for each month	104.4649	91.3494	95.5604	81.7484	77.4364	67.9277	66.2391	70.2575	72.4612	82.9181	90.5883	103.1329 (63)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	104.4649	91.3494	95.5604	81.7484	77.4364	67.9277	66.2391	70.2575	72.4612	82.9181	90.5883	103.1329 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 1004.0842 (64)											
Electric shower(s)	59.7381	53.2272	58.1220	55.4651	56.5059	53.9012	55.6979	56.5059	55.4651	58.1220	57.0291	59.7381 (64a)
Heat gains from water heating, kWh/month	41.0508	36.1442	38.4206	34.3034	33.4856	30.4572	30.4842	31.6909	31.9816	35.2600	36.9043	40.7178 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235	150.2235 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	188.1043	208.2583	188.1043	194.3744	188.1043	194.3744	188.1043	188.1043	194.3744	188.1043	194.3744	188.1043 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	372.9043	376.7739	367.0226	346.2635	320.0587	295.4300	278.9764	275.1068	284.8581	305.6172	331.8220	356.4507 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224	38.0224 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788 (71)
Water heating gains (Table 5)	55.1757	53.7859	51.6406	47.6436	45.0075	42.3017	40.9734	42.5953	44.4189	47.3925	51.2560	54.7282 (72)
Total internal gains	684.2513	706.8852	674.8346	656.3485	621.2375	600.1731	576.1212	573.8734	591.7184	609.1811	645.5195	667.3502 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	1.3600	10.6334	0.6300	0.7000	0.7700	4.4196 (74)						
East	22.6700	19.6403	0.6300	0.7000	0.7700	136.0726 (76)						
South	5.9300	46.7521	0.6300	0.7000	0.7700	84.7281 (78)						
West	12.5200	19.6403	0.6300	0.7000	0.7700	75.1490 (80)						
Horizontal	1.9600	26.0000	0.6300	0.7000	1.0000	20.2260 (82)						
Solar gains	320.5953	602.4110	946.2640	1331.9458	1604.8529	1634.2300	1559.1586	1355.0510	1082.7801	701.3555	394.9238	266.9320 (83)
Total gains	1004.8467	1309.2962	1621.0985	1988.2943	2226.0904	2234.4031	2135.2798	1928.9245	1674.4985	1310.5365	1040.4433	934.2823 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	33.8661	33.9249	33.9828	34.2572	34.3090	34.5523	34.5523	34.5978	34.4582	34.3090	34.2043	34.0955
alpha	3.2577	3.2617	3.2655	3.2838	3.2873	3.3035	3.3035	3.3065	3.2972	3.2873	3.2803	3.2730
util living area	0.9919	0.9807	0.9545	0.8856	0.7654	0.6038	0.4636	0.5236	0.7589	0.9381	0.9847	0.9936 (86)
MIT	18.6253	18.9673	19.4788	20.1140	20.5963	20.8689	20.9589	20.9386	20.7109	20.0181	19.1960	18.5690 (87)
Th 2	19.9228	19.9245	19.9261	19.9338	19.9352	19.9419	19.9419	19.9431	19.9393	19.9352	19.9323	19.9293 (88)
util rest of house												
MIT 2	0.9901	0.9766	0.9448	0.8612	0.7167	0.5252	0.3618	0.4184	0.6905	0.9197	0.9808	0.9922 (89)
Living area fraction	17.7501	18.0905	18.5949	19.2094	19.6458	19.8697	19.9269	19.9188	19.7582	19.1337	18.3254	17.6986 (90)
MIT	17.8339	18.1744	18.6795	19.2960	19.7368	19.9654	20.0257	20.0164	19.8494	19.2184	18.4088	17.7819 (92)
Temperature adjustment												0.0000
adjusted MIT	17.8339	18.1744	18.6795	19.2960	19.7368	19.9654	20.0257	20.0164	19.8494	19.2184	18.4088	17.7819 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9851	0.9673	0.9299	0.8436	0.7065	0.5270	0.3702	0.4262	0.6839	0.9035	0.9728	0.9880 (94)
Useful gains	989.8511	1266.4796	1507.4361	1677.3449	1572.8381	1177.5939	790.4568	822.0322	1145.1737	1184.0145	1012.1130	923.0736 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
3270.3490	3202.0750	2932.9619	2483.4213	1916.9517	1270.7481	811.3572	855.3953	1365.4219	2055.6702	2705.6421	3259.8592 (97)	
Space heating kWh	1696.6904	1300.7201	1060.5912	580.3750	256.0205	0.0000	0.0000	0.0000	0.0000	648.5118	1219.3410	1738.5685 (98a)
Space heating requirement - total per year (kWh/year)												8500.8185
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1696.6904	1300.7201	1060.5912	580.3750	256.0205	0.0000	0.0000	0.0000	0.0000	648.5118	1219.3410	1738.5685 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												8500.8185
Space heating per m2												(98c) / (4) = 42.0916 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2226.3091	1752.6263	1797.6304	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8100	0.8700	0.8321	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1803.2155	1524.7124	1495.8072	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2499.6923	2388.8311	2155.6452	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	501.4633	642.9043	490.9195	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	125.3658	160.7261	122.7299	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												408.8218 (107)
Energy for space heating												42.0916 (99)
Energy for space cooling												2.0243 (108)
Total												44.1159 (109)
Fabric Energy Efficiency (TFEE)												44.1 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	118.2700 (1b)	x	2.5000 (2b) = 295.6750 (1b) - (3b)
First floor	83.6900 (1c)	x	2.7000 (2c) = 225.9630 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	201.9600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 521.6380 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)

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Number of flueless gas fires

$0 * 40 = 0.0000$ (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
 Pressure test
 Pressure Test Method
 Measured/design AP50
 Infiltration rate
 Number of sides sheltered

Air changes per hour
 $40.0000 / (5) = 0.0767$ (8)
 Yes
 Blower Door
 5.0000 (17)
 0.3267 (18)
 2 (19)

Shelter factor (20) = $1 - [0.075 * (19)] = 0.8500$ (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.2777 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750
Adj infilt rate	0.3540	0.3471	0.3402	0.3054	0.2985	0.2638	0.2638	0.2569	0.2777	0.2985	0.3124	0.3263
Effective ac	0.5627	0.5602	0.5579	0.5466	0.5446	0.5348	0.5348	0.5330	0.5386	0.5446	0.5488	0.5532

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Half Glazed Door			6.0900	1.4000	8.5260		(26a)
1.4 Windows (Uw = 1.40)			42.4900	1.3258	56.3314		(27)
GF Lantern			1.9600	1.3258	2.5985		(27a)
New Ground			118.2700	0.1600	18.9232	110.0000	13009.7000 (28a)
External Brick	116.9000	35.3200	81.5800	0.1800	14.6844	60.0000	4894.8000 (29a)
External Rendered	105.0300	13.2600	91.7700	0.1700	15.6009	60.0000	5506.2000 (29a)
FF Plane	83.6900		83.6900	0.0700	5.8583	9.0000	753.2100 (30)
GF Flat	20.5400	1.9600	18.5800	0.1600	2.9728	9.0000	167.2200 (30)
GF Plane	14.0400		14.0400	0.0700	0.9828	9.0000	126.3600 (30)
Total net area of external elements Aum(A, m2)			458.4700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 126.4783		(33)
Internal Wall			304.8000			9.0000	2743.2000 (32c)
FF Internal			83.6900			18.0000	1506.4200 (32d)
GF Internal			83.6900			9.0000	753.2100 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 29460.3200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							145.8721 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	28.3500	0.1700	4.8195
E3 Sill	25.4500	0.0200	0.5090
E4 Jamb	56.5000	0.0150	0.8475
E5 Ground floor (normal)	46.7600	0.0490	2.2912
E6 Intermediate floor within a dwelling	38.9000	0.0010	0.0389
E10 Eaves (insulation at ceiling level)	44.6600	0.0560	2.5010
E12 Gable (insulation at ceiling level)	4.5000	0.0360	0.1620
E15 Flat roof with parapet	16.4900	0.3000	4.9470
E16 Corner (normal)	33.7000	0.0380	1.2806
E17 Corner (inverted - internal area greater than external area)	12.9000	-0.0740	-0.9546
R1 Head of roof window	0.8000	0.2400	0.1920
R2 Sill of roof window	0.8000	0.2400	0.1920
R3 Jamb of roof window	4.9000	0.2400	1.1760

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 18.0021 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 144.4804 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 * (25)m * (5)$

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	96.8588	96.4398	96.0292	94.1005	93.7396	92.0597	92.0597	91.7486	92.7068	93.7396	94.4696	95.2328
Average = Sum(39)m / 12 =	241.3392	240.9203	240.5096	238.5809	238.2200	236.5402	236.5402	236.2291	237.1872	238.2200	238.9500	239.7132
HLP	1.1950	1.1929	1.1909	1.1813	1.1795	1.1712	1.1712	1.1697	1.1744	1.1795	1.1832	1.1869
HLP (average)	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 3.0045 (42)

Hot water usage for mixer showers 74.5950 73.4739 71.8404 68.7149 66.4084 63.8362 62.3741 63.9953 65.7724 68.5342 71.7268 74.3091 (42a)

Hot water usage for baths 32.2015 31.7233 31.0498 29.8081 28.8783 27.8473 27.2904 27.9591 28.6873 29.7905 31.0578 32.0926 (42b)

Hot water usage for other uses 45.3988 43.7479 42.0971 40.4462 38.7953 37.1445 37.1445 38.7953 40.4462 42.0971 43.7479 45.3988 (42c)

Average daily hot water use (litres/day) 139.9015 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	152.1952	148.9451	144.9872	138.9692	134.0820	128.8279	126.8089	130.7497	134.9058	140.4217	146.5325	151.8006
Energy content (annual)	241.0400	212.0958	222.8400	190.2418	180.5001	158.4089	153.3644	161.8955	166.3524	190.5509	208.7624	237.6830
Distribution loss (46)m = $0.15 * (45)m$	36.1560	31.8144	33.4260	28.5363	27.0750	23.7613	23.0047	24.2843	24.9529	28.5826	31.3144	35.6524
Water storage loss: Store volume 250.0000 (47)												
b) If manufacturer declared loss factor is not known : Hot water storage loss factor from Table 2 (kWh/litre/day) 0.0103 (51)												
Volume factor from Table 2a 0.7830 (52)												
Temperature factor from Table 2b 0.5400 (53)												
Enter (49) or (54) in (55) 1.0875 (55)												
Total storage loss 33.7127 30.4501 33.7127 32.6252 33.7127 32.6252 33.7127 33.7127 32.6252 33.7127 32.6252 33.7127 (56)												
If cylinder contains dedicated solar storage 33.7127 30.4501 33.7127 32.6252 33.7127 32.6252 33.7127 33.7127 32.6252 33.7127 32.6252 33.7127 (57)												
Primary loss 23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 23.2624 22.5120 23.2624 22.5120 23.2624 (59)												
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)												

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Total heat required for water heating calculated for each month												
	298.0151	263.5572	279.8150	245.3790	237.4751	213.5461	210.3395	218.8705	221.4895	247.5260	263.8995	294.6580 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	298.0151	263.5572	279.8150	245.3790	237.4751	213.5461	210.3395	218.8705	221.4895	247.5260	263.8995	294.6580 (64)
	Total per year (kWh/year) = Sum(64)m =											2994.5706 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	125.7259	111.6909	119.6743	107.3651	105.5963	96.7807	96.5737	99.4103	99.4219	108.9382	113.5232	124.6096 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.2750	49.0947	39.9265	30.2270	22.5950	19.0757	20.6119	26.7921	35.9604	45.6599	53.2919	56.8112 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	556.5735	562.3490	547.7950	516.8111	477.6996	440.9402	416.3827	410.6072	425.1613	456.1451	495.2567	532.0160 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788 (71)
Water heating gains (Table 5)	168.9864	166.2068	160.8526	149.1182	141.9305	134.4176	129.8034	133.6160	138.0860	146.4223	157.6711	167.4861 (72)
Total internal gains	899.9556	896.7712	867.6948	815.2770	761.3458	710.5542	682.9187	687.1361	715.3283	767.3481	825.3404	875.4341 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
North	1.3600	10.6334	0.6300	0.7000	0.7700	4.4196 (74)						
East	22.6900	19.6403	0.6300	0.7000	0.7700	136.1926 (76)						
South	5.9300	46.7521	0.6300	0.7000	0.7700	84.7281 (78)						
West	12.5100	19.6403	0.6300	0.7000	0.7700	75.0890 (80)						
Horizontal	1.9600	26.0000	0.6300	0.7000	1.0000	20.2260 (82)						
Solar gains	320.6554	602.5285	946.4574	1332.2279	1605.1985	1634.5838	1559.4955	1355.3404	1083.0050	701.4948	394.9987	266.9814 (83)
Total gains	1220.6109	1499.2997	1814.1522	2147.5049	2366.5443	2345.1380	2242.4142	2042.4764	1798.3333	1468.8429	1220.3391	1142.4155 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	33.9084	33.9673	34.0253	34.3004	34.3524	34.5963	34.5963	34.6419	34.5020	34.3524	34.2474	34.1384
alpha	3.2606	3.2645	3.2684	3.2867	3.2902	3.3064	3.3064	3.3095	3.3001	3.2902	3.2832	3.2759
util living area	0.9857	0.9720	0.9396	0.8652	0.7410	0.5821	0.4437	0.4990	0.7301	0.9184	0.9760	0.9884 (86)
MIT	18.7897	19.1058	19.6047	20.1928	20.6374	20.8829	20.9640	20.9469	20.7455	20.1141	19.3292	18.7294 (87)
Th 2	19.9240	19.9257	19.9273	19.9350	19.9364	19.9431	19.9431	19.9443	19.9405	19.9364	19.9335	19.9305 (88)
util rest of house	0.9828	0.9662	0.9272	0.8380	0.6907	0.5043	0.3453	0.3970	0.6594	0.8957	0.9702	0.9860 (89)
MIT 2	17.3447	17.7462	18.3734	19.0961	19.6064	19.8612	19.9264	19.9177	19.7394	19.0212	18.0389	17.2719 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.4831	17.8764	18.4913	19.2011	19.7051	19.9590	20.0258	20.0162	19.8357	19.1259	18.1624	17.4114 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.4831	17.8764	18.4913	19.2011	19.7051	19.9590	20.0258	20.0162	19.8357	19.1259	18.1624	17.4114 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9724	0.9506	0.9054	0.8155	0.6785	0.5056	0.3533	0.4043	0.6515	0.8731	0.9558	0.9771 (94)
Useful gains	1186.9452	1425.2106	1642.5104	1751.3823	1605.6510	1185.6468	792.2340	825.8321	1171.6903	1282.4462	1166.4377	1116.2053 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	3181.5885	3126.2830	2884.0273	2457.6503	1906.9825	1267.6223	810.3377	854.2600	1360.4375	2031.0333	2643.3705	3166.9576 (97)
Space heating kWh	1484.0146	1143.1206	923.6886	508.5129	224.1906	0.0000	0.0000	0.0000	0.0000	556.9488	1063.3916	1525.7597 (98a)
Space heating requirement - total per year (kWh/year)	7429.6275											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	1484.0146	1143.1206	923.6886	508.5129	224.1906	0.0000	0.0000	0.0000	0.0000	556.9488	1063.3916	1525.7597 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	7429.6275											
Space heating per m ²	(98c) / (4) =											36.7876 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	249.9000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	1484.0146	1143.1206	923.6886	508.5129	224.1906	0.0000	0.0000	0.0000	0.0000	556.9488	1063.3916	1525.7597	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	593.8434	457.4312	369.6233	203.4866	89.7121	0.0000	0.0000	0.0000	0.0000	222.8687	425.5268	610.5481	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	298.0151	263.5572	279.8150	245.3790	237.4751	213.5461	210.3395	218.8705	221.4895	247.5260	263.8995	294.6580	(64)
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(216)
Fuel for water heating, kWh/month	170.1971	150.5181	159.8030	140.1365	135.6226	121.9566	120.1253	124.9974	126.4932	141.3626	150.7136	168.2799	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	48.3819	38.8137	34.9475	25.6040	19.7773	16.1582	18.0415	23.4510	30.4605	39.9659	45.1414	49.7265	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													2973.0402 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													175.1000
Water heating fuel used													1710.2059 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)
Electricity for lighting (calculated in Appendix L)													390.4694 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													5073.7155 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2973.0402	16.4900	490.2543 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1710.2059	16.4900	282.0130 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	390.4694	16.4900	64.3884 (250)
Additional standing charges			0.0000 (251)
Total energy cost			836.6557 (255)

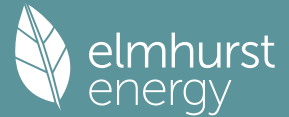
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		1.2196 (257)
SAP value		80.2300
SAP rating (Section 12)		80 (258)
SAP band		C

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2973.0402	0.1552	461.5624 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1710.2059	0.1409	241.0299 (264)
Space and water heating			702.5923 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	390.4694	0.1443	56.3568 (268)
Total CO2, kg/year			758.9491 (272)
CO2 emissions per m2			3.7600 (273)
EI value			95.8820
EI rating			96 (274)
EI band			A

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SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	118.2700 (1b)	x 2.5000 (2b)	= 295.6750 (1b) - (3b)
First floor	83.6900 (1c)	x 2.7000 (2c)	= 225.9630 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	201.9600		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 521.6380 (5)
Dwelling volume			

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0767 (8)
Pressure Test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3267	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2777 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	3.7000	3.4000	3.4000	3.2000	3.3000	3.0000	3.0000	2.8000	2.7000	2.8000	2.8000	3.1000
Wind factor	0.9250	0.8500	0.8500	0.8000	0.8250	0.7500	0.7500	0.7000	0.6750	0.7000	0.7000	0.7750
Adj infilt rate												
Effective ac	0.2569	0.2360	0.2360	0.2221	0.2291	0.2083	0.2083	0.1944	0.1874	0.1944	0.1944	0.2152
	0.5330	0.5279	0.5279	0.5247	0.5262	0.5217	0.5217	0.5189	0.5176	0.5189	0.5189	0.5232

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Half Glazed Door			6.0900	1.4000	8.5260		(26a)
1.4 Windows (Uw = 1.40)			42.4900	1.3258	56.3314		(27)
GF Lantern			1.9600	1.3258	2.5985		(27a)
New Ground			118.2700	0.1600	18.9232	110.0000	13009.7000 (28a)
External Brick	116.9000	35.3200	81.5800	0.1800	14.6844	60.0000	4894.8000 (29a)
External Rendered	105.0300	13.2600	91.7700	0.1700	15.6009	60.0000	5506.2000 (29a)
FF Plane	83.6900		83.6900	0.0700	5.8583	9.0000	753.2100 (30)
GF Flat	20.5400	1.9600	18.5800	0.1600	2.9728	9.0000	167.2200 (30)
GF Plane	14.0400		14.0400	0.0700	0.9828	9.0000	126.3600 (30)
Total net area of external elements Aum(A, m ²)			458.4700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 126.4783		(33)
Internal Wall			304.8000			9.0000	2743.2000 (32c)
FF Internal			83.6900			18.0000	1506.4200 (32d)
GF Internal			83.6900			9.0000	753.2100 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 29460.3200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							145.8721 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	28.3500	0.1700	4.8195
E1 Steel lintel with perforated steel base plate	25.4500	0.0200	0.5090
E3 Sill	56.5000	0.0150	0.8475
E4 Jamb	46.7600	0.0490	2.2912
E5 Ground floor (normal)	38.9000	0.0010	0.0389
E6 Intermediate floor within a dwelling	44.6600	0.0560	2.5010
E10 Eaves (insulation at ceiling level)	4.5000	0.0360	0.1620
E12 Gable (insulation at ceiling level)	16.4900	0.3000	4.9470
E15 Flat roof with parapet	33.7000	0.0380	1.2806
E16 Corner (normal)	12.9000	-0.0740	-0.9546
E17 Corner (inverted - internal area greater than external area)	0.8000	0.2400	0.1920
R1 Head of roof window	0.8000	0.2400	0.1920
R2 Sill of roof window	4.9000	0.2400	1.1760
R3 Jamb of roof window			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			18.0021 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	144.4804 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	91.7486	90.8652	90.8652	90.3176	90.5872	89.8033	89.8033	89.3222	89.0940	89.3222	89.3222	90.0563
Heat transfer coeff	236.2291	235.3456	235.3456	234.7981	235.0677	234.2837	234.2837	233.8026	233.5745	233.8026	233.8026	234.5368
Average = Sum(39)m / 12 =												234.5727

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1697	1.1653	1.1653	1.1626	1.1639	1.1601	1.1601	1.1577	1.1565	1.1577	1.1577	1.1613 (40)
HLP (average)												1.1615
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												3.0045 (42)
Hot water usage for mixer showers												74.3091 (42a)
Hot water usage for baths												32.0926 (42b)
Hot water usage for other uses												45.3988 (42c)
Average daily hot water use (litres/day)												139.9015 (43)
Daily hot water use	152.1952	148.9451	144.9872	138.9692	134.0820	128.8279	126.8089	130.7497	134.9058	140.4217	146.5325	151.8006 (44)
Energy conte	241.0400	212.0958	222.8400	190.2418	180.5001	158.4089	153.3644	161.8955	166.3524	190.5509	208.7624	237.6830 (45)
Energy content (annual)												2323.7353
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	36.1560	31.8144	33.4260	28.5363	27.0750	23.7613	23.0047	24.2843	24.9529	28.5826	31.3144	35.6524 (46)
Store volume												250.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0103 (51)
Volume factor from Table 2a												0.7830 (52)
Temperature factor from Table 2b												0.5400 (53)
Enter (49) or (54) in (55)												1.0875 (55)
Total storage loss	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127 (56)
If cylinder contains dedicated solar storage	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	298.0151	263.5572	279.8150	245.3790	237.4751	213.5461	210.3395	218.8705	221.4895	247.5260	263.8995	294.6580 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	298.0151	263.5572	279.8150	245.3790	237.4751	213.5461	210.3395	218.8705	221.4895	247.5260	263.8995	294.6580 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	125.7259	111.6909	119.6743	107.3651	105.5963	96.7807	96.5737	99.4103	99.4219	108.9382	113.5232	124.6096 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.2750	49.0947	39.9265	30.2270	22.5950	19.0757	20.6119	26.7921	35.9604	45.6599	53.2919	56.8112 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	556.5735	562.3490	547.7950	516.8111	477.6996	440.9402	416.3827	410.6072	425.1613	456.1451	495.2567	532.0160 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788 (71)
Water heating gains (Table 5)	168.9864	166.2068	160.8526	149.1182	141.9305	134.4176	129.8034	133.6160	138.0860	146.4223	157.6711	167.4861 (72)
Total internal gains	899.9556	896.7712	867.6948	815.2770	761.3458	710.5542	682.9187	687.1361	715.3283	767.3481	825.3404	875.4341 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	1.3600	12.7202	0.6300	0.7000	0.7700	5.2869 (74)						
East	22.6900	23.7470	0.6300	0.7000	0.7700	164.6703 (76)						
South	5.9300	53.7378	0.6300	0.7000	0.7700	97.3883 (78)						
West	12.5100	23.7470	0.6300	0.7000	0.7700	90.7900 (80)						
Horizontal	1.9600	32.0000	0.6300	0.7000	1.0000	24.8936 (82)						
Solar gains	383.0290	607.8427	963.4783	1388.1253	1618.1007	1771.0467	1672.2430	1470.9890	1180.7350	787.0201	453.3278	295.9896 (83)
Total gains	1282.9846	1504.6140	1831.1731	2203.4024	2379.4465	2481.6009	2355.1617	2158.1251	1896.0633	1554.3682	1278.6682	1171.4236 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	34.6419	34.7719	34.7719	34.8530	34.8130	34.9295	34.9295	35.0014	35.0356	35.0014	35.0014	34.8919
alpha	3.3095	3.3181	3.3181	3.3235	3.3209	3.3286	3.3286	3.3334	3.3357	3.3334	3.3334	3.3261
util living area	0.9817	0.9693	0.9301	0.8426	0.6975	0.4968	0.3505	0.3988	0.6711	0.8940	0.9689	0.9861 (86)
MIT	18.9976	19.2375	19.7642	20.3162	20.7333	20.9376	20.9858	20.9781	20.8242	20.2695	19.5227	18.9138 (87)
Th 2	19.9443	19.9479	19.9479	19.9500	19.9490	19.9521	19.9521	19.9540	19.9549	19.9540	19.9540	19.9511 (88)

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util rest of house	0.9778	0.9630	0.9156	0.8115	0.6403	0.4146	0.2519	0.2946	0.5926	0.8652	0.9612	0.9831 (89)
MIT 2	17.6218	17.9270	18.5857	19.2527	19.7188	19.9141	19.9474	19.9458	19.8260	19.2191	18.2962	17.5196 (90)
Living area fraction									FLA = Living area / (4) =			0.0958 (91)
MIT	17.7536	18.0525	18.6986	19.3546	19.8160	20.0121	20.0468	20.0447	19.9216	19.3197	18.4137	17.6531 (92)
Temperature adjustment												0.0000
adjusted MIT	17.7536	18.0525	18.6986	19.3546	19.8160	20.0121	20.0468	20.0447	19.9216	19.3197	18.4137	17.6531 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9658	0.9469	0.8935	0.7908	0.6324	0.4195	0.2610	0.3039	0.5898	0.8433	0.9450	0.9732	(94)
Useful gains	1239.1016	1424.6649	1636.1176	1742.5524	1504.6645	1041.1395	614.7106	655.9460	1118.3250	1310.7236	1208.3116	1140.0193	(95)
Ext temp.	4.9000	5.3000	7.1000	9.4000	12.5000	15.4000	17.4000	17.2000	14.6000	11.1000	7.7000	4.8000	(96)
Heat loss rate W	3036.3828	3001.2376	2729.6733	2337.3187	1719.7502	1080.5366	620.1055	665.0980	1242.9821	1921.7804	2504.8885	3014.5318	(97)
Space heating kWh	1337.1772	1059.4569	813.6054	428.2318	160.0237	0.0000	0.0000	0.0000	0.0000	454.6263	933.5353	1394.6373	(98a)
Space heating requirement - total per year (kWh/year)												6581.2939	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1337.1772	1059.4569	813.6054	428.2318	160.0237	0.0000	0.0000	0.0000	0.0000	454.6263	933.5353	1394.6373	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6581.2939	
Space heating per m2										(98c) / (4) =		32.5871	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													249.9000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	1337.1772	1059.4569	813.6054	428.2318	160.0237	0.0000	0.0000	0.0000	0.0000	454.6263	933.5353	1394.6373	(98)	
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)	
Space heating fuel (main heating system)	535.0849	423.9523	325.5724	171.3613	64.0351	0.0000	0.0000	0.0000	0.0000	181.9233	373.5636	558.0781	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating requirement	298.0151	263.5572	279.8150	245.3790	237.4751	213.5461	210.3395	218.8705	221.4895	247.5260	263.8995	294.6580	(64)	
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(216)	
Fuel for water heating, kWh/month	170.1971	150.5181	159.8030	140.1365	135.6226	121.9566	120.1253	124.9974	126.4932	141.3626	150.7136	168.2799	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)	
Lighting	48.3819	38.8137	34.9475	25.6040	19.7773	16.1582	18.0415	23.4510	30.4605	39.9659	45.1414	49.7265	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													2633.5710	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													175.1000	
Water heating fuel used													1710.2059	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													0.0000	(231)
Electricity for lighting (calculated in Appendix L)													390.4694	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													4734.2463	(238)

10a. Fuel costs - using BEDF prices (538)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
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Space heating - main system 1	2633.5710	25.1600	662.6065 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1710.2059	25.1600	430.2878 (247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	390.4694	25.1600	98.2421 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1191.1364 (255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2633.5710	0.1557	409.9375 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1710.2059	0.1409	241.0299 (264)
Space and water heating			650.9673 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	390.4694	0.1443	56.3568 (268)
Total CO2, kg/year			707.3241 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2633.5710	1.5763	4151.2445 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1710.2059	1.5211	2601.4501 (278)
Space and water heating			6752.6946 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	390.4694	1.5338	598.9150 (282)
Total Primary energy kWh/year			7351.6096 (286)

SAP 10 EPC IMPROVEMENTS

2687N

Current energy efficiency rating: C 80
 Current environmental impact rating: A 96

N Solar water heating			Recommended
U Solar photovoltaic panels			Recommended
V2 Wind turbine			Not applicable
Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.2	-£ 89	-44 kg (6.2%)
U Solar photovoltaic panels	+ 4.8	-£ 306	-237 kg (35.7%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar water heating	£89	0.22 kg/m ²	B 81 A 96
Solar photovoltaic panels	£306	1.17 kg/m ²	B 86 A 97
Total Savings	£395	1.39 kg/m²	

Potential energy efficiency rating: B 86
 Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 538 TEST (29 Feb 2024)
 Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

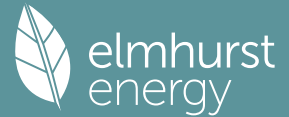
	Current	Potential	Saving
Electricity	£1191	£1102	£89
Space heating	£663	£683	-£21
Water heating	£430	£321	£109
Lighting	£98	£98	£0
Generated (PV)	-£0	-£306	£306
Total cost of fuels	£1191	£796	£395
Total cost of uses	£1191	£796	£394
Delivered energy	23 kWh/m ²	13 kWh/m ²	11 kWh/m ²
Carbon dioxide emissions	0.7 tonnes	0.4 tonnes	0.3 tonnes
CO2 emissions per m ²	4 kg/m ²	2 kg/m ²	1 kg/m ²
Primary energy	36 kWh/m ²	24 kWh/m ²	12 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
 CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Area (m ²)	Storey height (m)	Volume (m ³)
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Ground floor		118.2700 (1b)	x	2.5000 (2b)	=	295.6750 (1b)	-	(3b)
First floor		83.6900 (1c)	x	2.7000 (2c)	=	225.9630 (1c)	-	(3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	201.9600							(4)
Dwelling volume						(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	521.6380 (5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	40.0000 / (5) =	0.0767	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3267	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2777	(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750
Effective ac	0.3540	0.3471	0.3402	0.3054	0.2985	0.2638	0.2638	0.2569	0.2777	0.2985	0.3124	0.3263
	0.5627	0.5602	0.5579	0.5466	0.5446	0.5348	0.5348	0.5330	0.5386	0.5446	0.5488	0.5532

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Half Glazed Door			6.0900	1.4000	8.5260		(26a)
1.4 Windows (Uw = 1.40)			42.4900	1.3258	56.3314		(27)
GF Lantern			1.9600	1.3258	2.5985		(27a)
New Ground			118.2700	0.1600	18.9232	110.0000	13009.7000 (28a)
External Brick	116.9000	35.3200	81.5800	0.1800	14.6844	60.0000	4894.8000 (29a)
External Rendered	105.0300	13.2600	91.7700	0.1700	15.6009	60.0000	5506.2000 (29a)
FF Plane	83.6900		83.6900	0.0700	5.8583	9.0000	753.2100 (30)
GF Flat	20.5400	1.9600	18.5800	0.1600	2.9728	9.0000	167.2200 (30)
GF Plane	14.0400		14.0400	0.0700	0.9828	9.0000	126.3600 (30)
Total net area of external elements Aum(A, m2)			458.4700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	126.4783	(33)
Internal Wall			304.8000			9.0000	2743.2000 (32c)
FF Internal			83.6900			18.0000	1506.4200 (32d)
GF Internal			83.6900			9.0000	753.2100 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							29460.3200 (34)
List of Thermal Bridges							145.8721 (35)

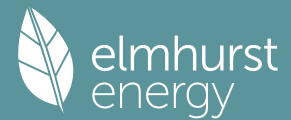
K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	28.3500	0.1700	4.8195
E3 Sill	25.4500	0.0200	0.5090
E4 Jamb	56.5000	0.0150	0.8475
E5 Ground floor (normal)	46.7600	0.0490	2.2912
E6 Intermediate floor within a dwelling	38.9000	0.0010	0.0389
E10 Eaves (insulation at ceiling level)	44.6600	0.0560	2.5010
E12 Gable (insulation at ceiling level)	4.5000	0.0360	0.1620
E15 Flat roof with parapet	16.4900	0.3000	4.9470
E16 Corner (normal)	33.7000	0.0380	1.2806
E17 Corner (inverted - internal area greater than external area)	12.9000	-0.0740	-0.9546
R1 Head of roof window	0.8000	0.2400	0.1920
R2 Sill of roof window	0.8000	0.2400	0.1920
R3 Jamb of roof window	4.9000	0.2400	1.1760
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			18.0021 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	144.4804 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	96.8588	96.4398	96.0292	94.1005	93.7396	92.0597	92.0597	91.7486	92.7068	93.7396	94.4696	95.2328
Average = Sum(39)m / 12 =	241.3392	240.9203	240.5096	238.5809	238.2200	236.5402	236.5402	236.2291	237.1872	238.2200	238.9500	239.7132
	238.5792											238.5792
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1950	1.1929	1.1909	1.1813	1.1795	1.1712	1.1712	1.1697	1.1744	1.1795	1.1832	1.1869
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												3.0045	(42)
Hot water usage for mixer showers													
	74.5950	73.4739	71.8404	68.7149	66.4084	63.8362	62.3741	63.9953	65.7724	68.5342	71.7268	74.3091	(42a)
Hot water usage for baths													
	32.2015	31.7233	31.0498	29.8081	28.8783	27.8473	27.2904	27.9591	28.6873	29.7905	31.0578	32.0926	(42b)
Hot water usage for other uses													
	45.3988	43.7479	42.0971	40.4462	38.7953	37.1445	37.1445	38.7953	40.4462	42.0971	43.7479	45.3988	(42c)
Average daily hot water use (litres/day)													139.9015
													(43)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	152.1952	148.9451	144.9872	138.9692	134.0820	128.8279	126.8089	130.7497	134.9058	140.4217	146.5325	151.8006	(44)
Energy conte	241.0400	212.0958	222.8400	190.2418	180.5001	158.4089	153.3644	161.8955	166.3524	190.5509	208.7624	237.6830	(45)
Energy content (annual)	0.15 x (45)m =												
Distribution loss	= 0.15 x (45)m												
	36.1560	31.8144	33.4260	28.5363	27.0750	23.7613	23.0047	24.2843	24.9529	28.5826	31.3144	35.6524	(46)
Water storage loss:													
Store volume													250.0000 (47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)													0.0103 (51)
Volume factor from Table 2a													0.7830 (52)
Temperature factor from Table 2b													0.5400 (53)
Enter (49) or (54) in (55)													1.0875 (55)
Total storage loss	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127	(56)
If cylinder contains dedicated solar storage	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	298.0151	263.5572	278.4193	238.6254	224.6808	200.9393	197.3125	206.7741	216.0867	246.1302	263.8995	294.6580	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Aperture area of solar collector													3.0000 (H1)
Zero-loss collector efficiency													0.8000 (H2)
Collector linear heat loss coefficient													1.8000 (H3)
Collector 2nd order heat loss coefficient													0.0000 (H4)
Collector loop efficiency													0.9000 (H5)
Incidence angle modifier													1.0000 (H6)
Overshading factor													0.8000 (H8)
Overall heat loss coefficient of system													6.5000 (H10)
Heat loss coefficient of collector loop													3.9667 (H11)
Dedicated solar storage volume													75.0000 (H12)
Effective solar volume													75.0000 (H14)
Reference volume													225.0000 (H15)
Storage tank correction coefficient													1.3161 (H16)
Heat delivered to hot water													635.4149 (H24)
Heat delivered to space heating													0.0000 (H29)
Solar input													635.4149
Solar input	-0.0000	-16.1890	-59.0043	-81.6874	-107.4993	-99.2358	-98.5969	-85.7618	-58.6688	-28.7715	-0.0000	-0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	298.0151	247.3682	219.4150	156.9379	117.1815	101.7036	98.7156	121.0123	157.4178	217.3587	263.8995	294.6580	(64)
	Total per year (kWh/year) = Sum(64)m =											2293.6833 (64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
	Total Energy used by instantaneous electric shower (s) = Sum(64a)m =											0.0000 (64a)	
Heat gains from water heating, kWh/month	125.7259	111.6909	118.5577	101.9622	95.3609	86.6953	86.1522	89.7331	95.0996	107.8216	113.5232	124.6096	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.2750	49.0947	39.9265	30.2270	22.5950	19.0757	20.6119	26.7921	35.9604	45.6599	53.2919	56.8112	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	556.5735	562.3490	547.7950	516.8111	477.6996	440.9402	416.3827	410.6072	425.1613	456.1451	495.2567	532.0160	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	(71)
Water heating gains (Table 5)	168.9864	166.2068	159.3518	141.6142	128.1732	120.4101	115.7959	120.6090	132.0828	144.9215	157.6711	167.4861	(72)
Total internal gains	899.9556	896.7712	866.1940	807.7730	747.5885	696.5467	668.9113	674.1291	709.3251	765.8473	825.3404	875.4341	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b g	Specific data or Table 6c FF	Access factor Table 6d	Gains W							
North	1.3600	10.6334	0.6300	0.7000	0.7700	4.4196 (74)							
East	22.6900	19.6403	0.6300	0.7000	0.7700	136.1926 (76)							
South	5.9300	46.7521	0.6300	0.7000	0.7700	84.7281 (78)							
West	12.5100	19.6403	0.6300	0.7000	0.7700	75.0890 (80)							
Horizontal	1.9600	26.0000	0.6300	0.7000	1.0000	20.2260 (82)							
Solar gains	320.6554	602.5285	946.4574	1332.2279	1605.1985	1634.5838	1559.4955	1355.3404	1083.0050	701.4948	394.9987	266.9814	(83)
Total gains	1220.6109	1499.2997	1812.6514	2140.0009	2352.7870	2331.1305	2228.4067	2029.4695	1792.3301	1467.3421	1220.3391	1142.4155	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	33.9084	33.9673	34.0253	34.3004	34.3524	34.5963	34.5963	34.6419	34.5020	34.3524	34.2474	34.1384	
alpha	3.2606	3.2645	3.2684	3.2867	3.2902	3.3064	3.3064	3.3095	3.3001	3.2902	3.2832	3.2759	
util living area	0.9857	0.9720	0.9397	0.8662	0.7433	0.5847	0.4462	0.5017	0.7314	0.9186	0.9760	0.9884	(86)
MIT	18.7897	19.1058	19.6037	20.1893	20.6338	20.8813	20.9634	20.9461	20.7440	20.1133	19.3292	18.7294	(87)
Th 2	19.9240	19.9257	19.9273	19.9350	19.9364	19.9431	19.9431	19.9443	19.9405	19.9364	19.9335	19.9305	(88)
util rest of house	0.9828	0.9662	0.9274	0.8391	0.6931	0.5068	0.3473	0.3993	0.6609	0.8959	0.9702	0.9860	(89)
MIT 2	17.3447	17.7462	18.3723	19.0921	19.6027	19.8600	19.9261	19.9172	19.7380	19.0202	18.0389	17.2719	(90)

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Living area fraction										FLA = Living area / (4) =	0.0958 (91)	
MIT	17.4831	17.8764	18.4902	19.1972	19.7014	19.9578	20.0255	20.0157	19.8343	19.1249	18.1624	17.4114 (92)
Temperature adjustment												0.0000
adjusted MIT	17.4831	17.8764	18.4902	19.1972	19.7014	19.9578	20.0255	20.0157	19.8343	19.1249	18.1624	17.4114 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9724	0.9506	0.9055	0.8166	0.6808	0.5080	0.3553	0.4066	0.6529	0.8733	0.9558	0.9771	(94)
Useful gains	1186.9452	1425.2106	1641.4358	1747.5214	1601.7405	1184.2036	791.8443	825.2355	1170.2074	1281.4899	1166.4377	1116.2053	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	3181.5885	3126.2830	2883.7588	2456.7140	1906.1024	1267.3264	810.2611	854.1416	1360.1106	2030.7973	2643.3705	3166.9576	(97)
Space heating kWh	1484.0146	1143.1206	924.2883	510.6187	226.4453	0.0000	0.0000	0.0000	0.0000	557.4847	1063.3916	1525.7597	(98a)
Space heating requirement - total per year (kWh/year)												7435.1235	
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1484.0146	1143.1206	924.2883	510.6187	226.4453	0.0000	0.0000	0.0000	0.0000	557.4847	1063.3916	1525.7597	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7435.1235	
Space heating per m2												(98c) / (4) =	36.8148 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													249.9000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	1484.0146	1143.1206	924.2883	510.6187	226.4453	0.0000	0.0000	0.0000	0.0000	557.4847	1063.3916	1525.7597	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	593.8434	457.4312	369.8633	204.3292	90.6143	0.0000	0.0000	0.0000	0.0000	223.0831	425.5268	610.5481	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	298.0151	247.3682	219.4150	156.9379	117.1815	101.7036	98.7156	121.0123	157.4178	217.3587	263.8995	294.6580	(64)
Efficiency of water heater	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(216)
Fuel for water heating, kWh/month	170.1971	141.2725	125.3084	89.6276	66.9226	58.0831	56.3767	69.1104	89.9017	124.1340	150.7136	168.2799	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	48.3819	38.8137	34.9475	25.6040	19.7773	16.1582	18.0415	23.4510	30.4605	39.9659	45.1414	49.7265	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-41.0776	-62.9524	-96.7017	-113.1496	-121.6867	-108.2367	-106.6870	-99.2541	-86.0579	-73.1477	-46.6230	-34.9676	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.0089	-20.6276	-45.6446	-77.6224	-113.9961	-123.4770	-121.9645	-100.5199	-70.4052	-33.6982	-12.7868	-6.9463	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													2975.2395 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													175.1000
Water heating fuel used													1309.9277 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
pump for solar water heating													80.0000 (230g)
Total electricity for the above, kWh/year													80.0000 (231)
Electricity for lighting (calculated in Appendix L)													390.4694 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-1727.2394 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													3028.3971 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2975.2395	16.4900	490.6170 (240)
Total CO2 associated with community systems			0.0000 (473)

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Water heating (other fuel)	1309.9277	16.4900	216.0071 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	16.4900	13.1920 (249)
Energy for lighting	390.4694	16.4900	64.3884 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-990.5418	16.4900	-163.3403
PV Unit electricity exported	-736.6976	5.5900	-41.1814
Total			-204.5217 (252)
Total energy cost			579.6827 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.8450 (257)
SAP value		86.3022
SAP rating (Section 12)		86 (258)
SAP band		B

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2975.2395	0.1552	461.8679 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1309.9277	0.1452	190.1742 (264)
Space and water heating			652.0421 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	390.4694	0.1443	56.3568 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-990.5418	0.1342	-132.9405
PV Unit electricity exported	-736.6976	0.1219	-89.8365
Total			-222.7770 (269)
Total CO2, kg/year			496.7190 (272)
CO2 emissions per m2			2.4600 (273)
EI value			97.3048
EI rating			97 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	118.2700 (1b)	x 2.5000 (2b)	= 295.6750 (1b) - (3b)
First floor	83.6900 (1c)	x 2.7000 (2c)	= 225.9630 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	201.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	521.6380 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0767 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3267 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2777 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	3.7000	3.4000	3.4000	3.2000	3.3000	3.0000	3.0000	2.8000	2.7000	2.8000	2.8000	3.1000 (22)
Wind factor	0.9250	0.8500	0.8500	0.8000	0.8250	0.7500	0.7500	0.7000	0.6750	0.7000	0.7000	0.7750 (22a)
Adj infilt rate												
Effective ac	0.2569	0.2360	0.2360	0.2221	0.2291	0.2083	0.2083	0.1944	0.1874	0.1944	0.1944	0.2152 (22b)
	0.5330	0.5279	0.5279	0.5247	0.5262	0.5217	0.5217	0.5189	0.5176	0.5189	0.5189	0.5232 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Half Glazed Door			6.0900	1.4000	8.5260			(26a)
1.4 Windows (Uw = 1.40)			42.4900	1.3258	56.3314			(27)
GF Lantern			1.9600	1.3258	2.5985			(27a)
New Ground			118.2700	0.1600	18.9232	110.0000	13009.7000	(28a)
External Brick	116.9000	35.3200	81.5800	0.1800	14.6844	60.0000	4894.8000	(28a)
External Rendered	105.0300	13.2600	91.7700	0.1700	15.6009	60.0000	5506.2000	(29a)
FF Plane	83.6900		83.6900	0.0700	5.8583	9.0000	753.2100	(30)
GF Flat	20.5400	1.9600	18.5800	0.1600	2.9728	9.0000	167.2200	(30)
GF Plane	14.0400		14.0400	0.0700	0.9828	9.0000	126.3600	(30)
Total net area of external elements Aum(A, m2)			458.4700					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	126.4783		(33)
Internal Wall			304.8000			9.0000	2743.2000	(32c)
FF Internal			83.6900			18.0000	1506.4200	(32d)
GF Internal			83.6900			9.0000	753.2100	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 29460.3200 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 145.8721 (35)

List of Thermal Bridges	K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate		28.3500	0.1700	4.8195
E3 Sill		25.4500	0.0200	0.5090
E4 Jamb		56.5000	0.0150	0.8475
E5 Ground floor (normal)		46.7600	0.0490	2.2912
E6 Intermediate floor within a dwelling		38.9000	0.0010	0.0389
E10 Eaves (insulation at ceiling level)		44.6600	0.0560	2.5010
E12 Gable (insulation at ceiling level)		4.5000	0.0360	0.1620
E15 Flat roof with parapet		16.4900	0.3000	4.9470
E16 Corner (normal)		33.7000	0.0380	1.2806
E17 Corner (inverted - internal area greater than external area)		12.9000	-0.0740	-0.9546
R1 Head of roof window		0.8000	0.2400	0.1920
R2 Sill of roof window		0.8000	0.2400	0.1920
R3 Jamb of roof window		4.9000	0.2400	1.1760

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 18.0021 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 144.4804 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	91.7486	90.8652	90.8652	90.3176	90.5872	89.8033	89.8033	89.3222	89.0940	89.3222	89.3222	90.0563
Heat transfer coeff	236.2291	235.3456	235.3456	234.7981	235.0677	234.2837	234.2837	233.8026	233.5745	233.8026	233.8026	234.5368
Average = Sum(39)m / 12 =												234.5727

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1697	1.1653	1.1653	1.1626	1.1639	1.1601	1.1601	1.1577	1.1565	1.1577	1.1577	1.1613
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													3.0045	(42)
Hot water usage for mixer showers														
74.5950	73.4739	71.8404	68.7149	66.4084	63.8362	62.3741	63.9953	65.7724	68.5342	71.7268	74.3091	74.3091	(42a)	
Hot water usage for baths														
32.2015	31.7233	31.0498	29.8081	28.8783	27.8473	27.2904	27.9591	28.6873	29.7905	31.0578	32.0926	32.0926	(42b)	
Hot water usage for other uses														
45.3988	43.7479	42.0971	40.4462	38.7953	37.1445	37.1445	38.7953	40.4462	42.0971	43.7479	45.3988	45.3988	(42c)	
Average daily hot water use (litres/day)													139.9015	(43)
Daily hot water use	152.1952	148.9451	144.9872	138.9692	134.0820	128.8279	126.8089	130.7497	134.9058	140.4217	146.5325	151.8006	(44)	
Energy content (annual)	241.0400	212.0958	222.8400	190.2418	180.5001	158.4089	153.3644	161.8955	166.3524	190.5509	208.7624	237.6830	(45)	
Distribution loss (46)m = 0.15 x (45)m														
36.1560	31.8144	33.4260	28.5363	27.0750	23.7613	23.0047	24.2843	24.9529	28.5826	31.3144	35.6524	35.6524	(46)	
Water storage loss:														
Store volume													250.0000	(47)
b) If manufacturer declared loss factor is not known :														
Hot water storage loss factor from Table 2 (kWh/litre/day)													0.0103	(51)
Volume factor from Table 2a													0.7830	(52)
Temperature factor from Table 2b													0.5400	(53)
Enter (49) or (54) in (55)													1.0875	(55)
Total storage loss	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	(56)
If cylinder contains dedicated solar storage	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	(57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	298.0151	263.5572	278.4193	238.6254	224.6808	200.9393	197.3125	206.7741	216.0867	246.1302	263.8995	294.6580	(62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Aperture area of solar collector													3.0000	(H1)
Zero-loss collector efficiency													0.8000	(H2)
Collector linear heat loss coefficient													1.8000	(H3)
Collector 2nd order heat loss coefficient													0.0000	(H4)
Collector loop efficiency													0.9000	(H5)
Incidence angle modifier													1.0000	(H6)
Overshading factor													0.8000	(H8)
Overall heat loss coefficient of system													6.5000	(H10)
Heat loss coefficient of collector loop													3.9667	(H11)
Dedicated solar storage volume													75.0000	(H12)
Effective solar volume													75.0000	(H14)
Reference volume													225.0000	(H15)
Storage tank correction coefficient													1.3161	(H16)
Heat delivered to hot water													695.9664	(H24)
Heat delivered to space heating													0.0000	(H29)
Solar input													695.9664	(H29)
Solar input	-0.2634	-16.9032	-61.1604	-86.6618	-109.3278	-109.4985	-107.5939	-95.7484	-67.3183	-38.0091	-3.4816	-0.0000	-0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h														

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297.7517	246.6540	217.2589	151.9636	115.3530	91.4409	89.7186	111.0256	148.7684	208.1212	260.4180	294.6580 (64)	
Total per year (kWh/year) = Sum(64)m =											2233.1318 (64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)	
Heat gains from water heating, kWh/month	125.7259	111.6909	118.5577	101.9622	95.3609	86.6953	86.1522	89.7331	95.0996	107.8216	113.5232	124.6096 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682	180.2682 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	55.2750	49.0947	39.9265	30.2270	22.5950	19.0757	20.6119	26.7921	35.9604	45.6599	53.2919	56.8112 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	556.5735	562.3490	547.7950	516.8111	477.6996	440.9402	416.3827	410.6072	425.1613	456.1451	495.2567	532.0160 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313	56.0313 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788	-120.1788 (71)
Water heating gains (Table 5)	168.9864	166.2068	159.3518	141.6142	128.1732	120.4101	115.7959	120.6090	132.0828	144.9215	157.6711	167.4861 (72)
Total internal gains	899.9556	896.7712	866.1940	807.7730	747.5885	696.5467	668.9113	674.1291	709.3251	765.8473	825.3404	875.4341 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	FF Table 6d	Access factor Table 6d	Gains W
North	1.3600	12.7202	0.6300	0.7000	0.7700	5.2869 (74)	
East	22.6900	23.7470	0.6300	0.7000	0.7700	164.6703 (76)	
South	5.9300	53.7378	0.6300	0.7000	0.7700	97.3883 (78)	
West	12.5100	23.7470	0.6300	0.7000	0.7700	90.7900 (80)	
Horizontal	1.9600	32.0000	0.6300	0.7000	1.0000	24.8936 (82)	

Solar gains	383.0290	607.8427	963.4783	1388.1253	1618.1007	1771.0467	1672.2430	1470.9890	1180.7350	787.0201	453.3278	295.9896 (83)
Total gains	1282.9846	1504.6140	1829.6723	2195.8984	2365.6892	2467.5935	2341.1542	2145.1182	1890.0601	1552.8674	1278.6682	1171.4236 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	34.6419	34.7719	34.7719	34.8530	34.8130	34.9295	34.9295	35.0014	35.0356	35.0014	35.0014	34.8919
alpha	3.3095	3.3181	3.3181	3.3235	3.3209	3.3286	3.3286	3.3334	3.3357	3.3334	3.3334	3.3261
util living area	0.9817	0.9693	0.9302	0.8437	0.7000	0.4992	0.3525	0.4010	0.6724	0.8943	0.9689	0.9861 (86)
MIT	18.9976	19.2375	19.7633	20.3131	20.7303	20.9367	20.9856	20.9777	20.8231	20.2687	19.5227	18.9138 (87)
Th 2	19.9443	19.9479	19.9479	19.9500	19.9490	19.9521	19.9521	19.9540	19.9549	19.9540	19.9540	19.9511 (88)
util rest of house	0.9778	0.9630	0.9158	0.8127	0.6428	0.4167	0.2534	0.2963	0.5940	0.8655	0.9612	0.9831 (89)
MIT 2	17.6218	17.9270	18.5846	19.2492	19.7160	19.9135	19.9473	19.9457	19.8250	19.2182	18.2962	17.5196 (90)
Living area fraction	17.7536	18.0525	18.6975	19.3511	19.8132	20.0115	20.0467	20.0445	19.9206	19.3188	18.4137	17.6531 (91)
Temperature adjustment												0.0000
adjusted MIT	17.7536	18.0525	18.6975	19.3511	19.8132	20.0115	20.0467	20.0445	19.9206	19.3188	18.4137	17.6531 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9658	0.9469	0.8937	0.7920	0.6347	0.4216	0.2625	0.3057	0.5911	0.8435	0.9450	0.9732 (94)
Useful gains	1239.1016	1424.6649	1635.0909	1739.0710	1501.6030	1040.4141	614.5911	655.7466	1117.2814	1309.8711	1208.3116	1140.0193 (95)
Ext temp.	4.9000	5.3000	7.1000	9.4000	12.5000	15.4000	17.4000	17.2000	14.6000	11.1000	7.7000	4.8000 (96)
Heat loss rate W	3036.3828	3001.2376	2729.4211	2336.4946	1719.0855	1080.3931	620.0820	665.0590	1242.7619	1921.5748	2504.8885	3014.5318 (97)
Space heating kWh	1337.1772	1059.4569	814.1816	430.1449	161.8070	0.0000	0.0000	0.0000	0.0000	455.1076	933.5353	1394.6373 (98a)
Space heating requirement - total per year (kWh/year)												6586.0478
Solar heating kWh	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1337.1772	1059.4569	814.1816	430.1449	161.8070	0.0000	0.0000	0.0000	0.0000	455.1076	933.5353	1394.6373 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6586.0478
Space heating per m ²												(98c) / (4) = 32.6107 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												249.9000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1337.1772	1059.4569	814.1816	430.1449	161.8070	0.0000	0.0000	0.0000	0.0000	455.1076	933.5353	1394.6373 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)

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Space heating fuel (main heating system)	535.0849	423.9523	325.8030	172.1268	64.7487	0.0000	0.0000	0.0000	0.0000	182.1159	373.5636	558.0781	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	297.7517	246.6540	217.2589	151.9636	115.3530	91.4409	89.7186	111.0256	148.7684	208.1212	260.4180	294.6580	(64)
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(216)
Fuel for water heating, kWh/month	170.0466	140.8646	124.0770	86.7868	65.8784	52.2221	51.2385	63.4070	84.9619	118.8585	148.7253	168.2799	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	48.3819	38.8137	34.9475	25.6040	19.7773	16.1582	18.0415	23.4510	30.4605	39.9659	45.1414	49.7265	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-47.6790	-62.8663	-96.8536	-114.7963	-120.1691	-112.8828	-110.6368	-103.8980	-90.8052	-78.8744	-51.9572	-38.0530	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-11.8508	-21.0553	-47.5080	-83.5062	-117.0877	-137.9406	-134.2737	-112.5071	-79.2269	-40.4699	-15.8884	-8.1807	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2635.4733	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1275.3465	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												80.0000	(231)
Electricity for lighting (calculated in Appendix L)												390.4694	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1838.9671	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												2542.3222	(238)

10a. Fuel costs - using BEDF prices (538)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2635.4733	25.1600	663.0851	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1275.3465	25.1600	320.8772	(247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Pump for solar water heating	80.0000	25.1600	20.1280	(249)
Energy for lighting	390.4694	25.1600	98.2421	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1029.4716	25.1600	-259.0151	
PV Unit electricity exported	-809.4954	5.8100	-47.0317	
Total			-306.0467	(252)
Total energy cost			796.2856	(255)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2635.4733	0.1556	410.2026	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1275.3465	0.1457	185.8191	(264)
Space and water heating			596.0218	(265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970	(267)
Energy for lighting	390.4694	0.1443	56.3568	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1029.4716	0.1343	-138.2436	
PV Unit electricity exported	-809.4954	0.1217	-98.5525	
Total			-236.7961	(269)
Total CO2, kg/year			426.6794	(272)

13a. Primary energy - Individual heating systems including micro-CHP

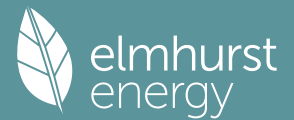
	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2635.4733	1.5762	4154.1281	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1275.3465	1.5390	1962.7100	(278)

Full SAP Calculation Printout



Space and water heating			6116.8381 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	390.4694	1.5338	598.9150 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1029.4716	1.4963	-1540.3839
PV Unit electricity exported	-809.4954	0.4466	-361.4993
Total			-1901.8832 (283)
Total Primary energy kWh/year			4934.8938 (286)

Predicted Energy Assessment

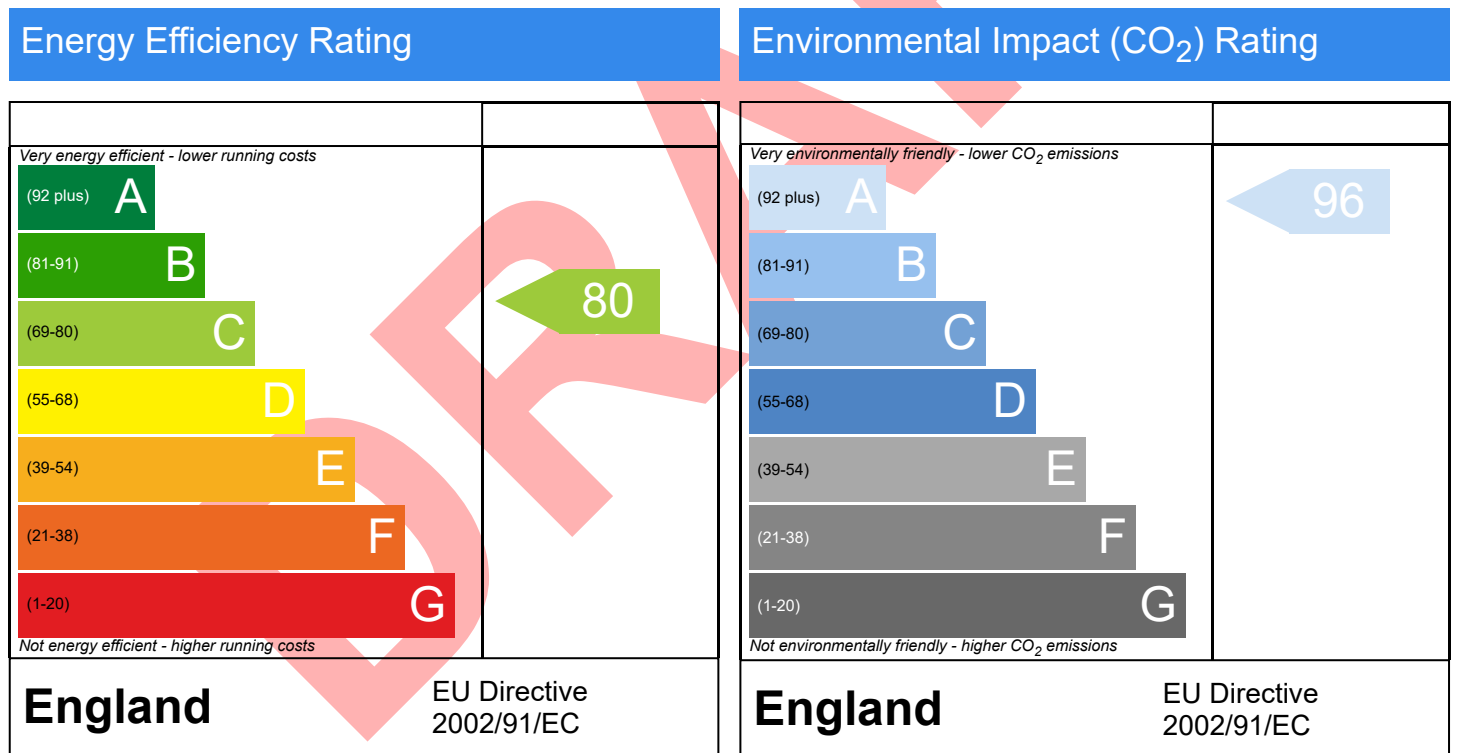


9, Longmead, Guildford, GU1 2HN

Dwelling type: House, Detached
 Date of assessment: 22/03/2024
 Produced by: Nikki Kells
 Total floor area: 201.96 m²
 DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

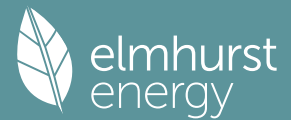
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

Summary for Input Data



Property Reference	9 Longmead	Issued on Date	22/03/2024
Assessment Reference	2687N	Prop Type Ref	
Property	9, Longmead, Guildford, GU1 2HN		

SAP Rating	80 C	DER	3.83	TER	8.47
Environmental	96 A	% DER < TER			54.78
CO ₂ Emissions (t/year)	0.71	DFEE	44.04	TFEE	44.12
Compliance Check	See BREL	% DFEE < TFEE			0.16
% DPER < TPER	11.56	DPER	39.77	TPER	44.97

Assessor Details	Mrs. Nikki Kells	Assessor ID	L822-0001
Client	Owner, Owner		

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	West
Property Tenure	1
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	House, Detached
2.0 Number of Storeys	2
3.0 Date Built	2024
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	46.76 m	118.27 m ²	2.50 m
1st Storey:	38.90 m	83.69 m ²	2.70 m

8.0 Living Area	19.34	m ²
-----------------	-------	----------------

9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	External Brick	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	116.90	81.58	0.00	None	35.32	Enter Gross Area
	External Rendered	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.17	60.00	105.03	91.78	0.00	None	13.25	Enter Gross Area

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall	Plasterboard on timber frame	9.00	304.80

10.0 External Roofs	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
	FF Plane	External Plane Roof	Plasterboard, insulated at ceiling level	0.07	9.00	83.69	83.69	None	0.00	Enter Gross Area	0.00
	GF Flat	External Flat Roof	Plasterboard, insulated flat roof	0.16	9.00	20.54	18.58	None	0.00	Enter Gross Area	1.96
	GF Plane	External Plane Roof	Plasterboard, insulated at ceiling level	0.07	9.00	14.04	14.04	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings	Description	Storey	Construction	Area (m ²)
	GF Internal	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	83.69

11.0 Heat Loss Floors	Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
	New Ground	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.16	None	0.00	110.00	118.27

11.2 Internal Floors

Summary for Input Data



Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
FF Internal		Plasterboard ceiling, carpeted chipboard floor	9.00	83.69

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Half Glazed Door	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05			0.63		0.70	1.40
1.4 Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Lantern	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.63		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
W Door	Half Glazed Door	External Brick	West	4.20	
W Brick	1.4 Windows	External Brick	West	6.26	
W Rend	1.4 Windows	External Rendered	West	6.25	
N Brick	1.4 Windows	External Brick	North	1.36	
N Door	Half Glazed Door	External Brick	North	1.89	
S Brick	1.4 Windows	External Brick	South	5.05	
S Rend	1.4 Windows	External Rendered	South	0.88	
E Brick	1.4 Windows	External Brick	East	16.56	
E Rend	1.4 Windows	External Rendered	East	6.12	
GF Lantern	Lantern	GF Flat	Horizontal	1.96	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Independently assessed	28.35	0.17	0.17	Yes
E3 Sill	Independently assessed	25.45	0.02	0.02	Yes
E4 Jamb	Independently assessed	56.50	0.01	0.01	Yes
E5 Ground floor (normal)	Independently assessed	46.76	0.05	0.05	Yes
E6 Intermediate floor within a dwelling	Independently assessed	38.90	0.00	0.00	Yes
E10 Eaves (insulation at ceiling level)	Independently assessed	44.66	0.06	0.06	No
E12 Gable (insulation at ceiling level)	Independently assessed	4.50	0.04	0.04	No
E15 Flat roof with parapet	Table K1 - Default	16.49	0.30	0.30	No
E16 Corner (normal)	Independently assessed	33.70	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Independently assessed	12.90	-0.07	-0.07	No
R1 Head of roof window	Table K1 - Default	0.80	0.24	0.24	Yes
R2 Sill of roof window	Table K1 - Default	0.80	0.24	0.24	Yes
R3 Jamb of roof window	Table K1 - Default	4.90	0.24	0.24	Yes

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Test Method

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Low energy Lighting	75.00	5	375	30

24.0 Main Heating 1

Description

Percentage of Heat %

Fuel Type

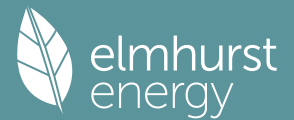
SAP Code

In Winter

In Summer

Controls SAP Code

Summary for Input Data



PCDF Controls	0
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Enter value
Flow Temperature Value	35.00

25.0 Main Heating 2

26.0 Heat Networks

Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1									
Heat source 2									
Heat source 3									
Heat source 4									
Heat source 5									

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From mains
Bath Count	1

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Foam
Insulation Thickness Type	100 mm
Cylinder Volume	250.00 L
Pipes insulation	Fully insulated primary pipework
In Airing Cupboard	No

31.0 Thermal Store

34.0 Small-scale Hydro

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations
 Lower cost measures
 None
 Further measures to achieve even higher standards

Typical Cost	Typical savings per year	Ratings after improvement	
		SAP rating	Environmental Impact
£4,000 - £6,000	£89	B 81	A 96
£3,500 - £5,500	£306	B 86	A 97
		0	0

Thermal Bridging



Property Reference	9 Longmead	Issued on Date	22/03/2024
Assessment Reference	2687N	Prop Type Ref	Detached House
Property	9, Longmead, Guildford, GU1 2HN		

SAP Rating	80 C	DER	3.83	TER	8.47
Environmental	96 A	% DER < TER			54.78
CO ₂ Emissions (t/year)	0.71	DFEE	44.04	TFEE	44.12
Compliance Check	See BREL	% DFEE < TFEE			0.16
% DPER < TPER	11.56	DPER	39.77	TPER	44.97

Assessor Details	Mrs. Nikki Kells	Assessor ID	L822-0001
Client	Owner, Owner		

	Junction details	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E1 Steel lintel with perforated steel base plate	Independently assessed	0.170	28.35	4.82	
External wall	E3 Sill	Independently assessed	0.020	25.45	0.51	
External wall	E4 Jamb	Independently assessed	0.015	56.50	0.85	
External wall	E5 Ground floor (normal)	Independently assessed	0.049	46.76	2.29	
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.001	38.90	0.04	
External wall	E10 Eaves (insulation at ceiling level)	Independently assessed	0.056	44.66	2.50	
External wall	E12 Gable (insulation at ceiling level)	Independently assessed	0.036	4.50	0.16	
External wall	E15 Flat roof with parapet	Table K1 - Default	0.300	16.49	4.95	
External wall	E16 Corner (normal)	Independently assessed	0.038	33.70	1.28	
External wall	E17 Corner (inverted – internal area greater than external area)	Independently assessed	-0.074	12.90	-0.95	
External roof	R1 Head of roof window	Table K1 - Default	0.240	0.80	0.19	
External roof	R2 Sill of roof window	Table K1 - Default	0.240	0.80	0.19	
External roof	R3 Jamb of roof window	Table K1 - Default	0.240	4.90	1.18	

Total: 314.71 W/mK:
 Y-Value: 0.04 W/m²K:

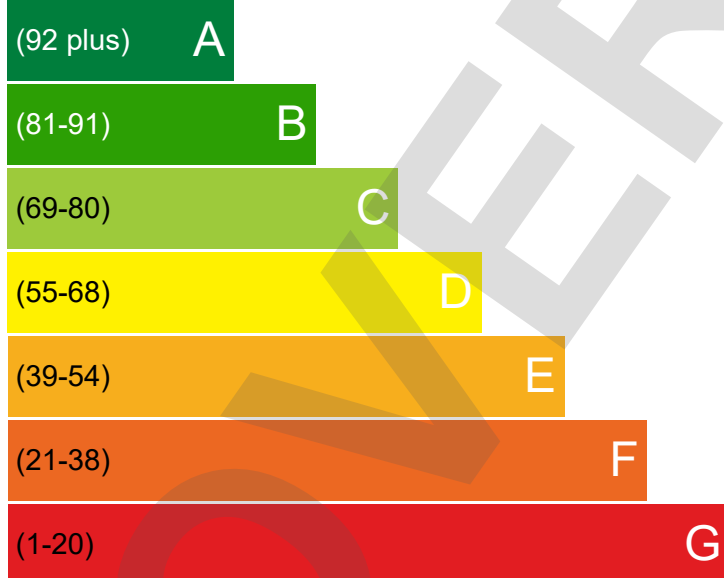
Dwelling Address	9, Longmead, Guildford, GU1 2HN
Report Date	22/03/2024
Property Type	House, Detached
Floor Area [m ²]	202

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.

Most energy efficient - lower running costs



CURRENT

POTENTIAL

80

86

Least energy efficient - higher running costs

Breakdown of property's energy performance

Each feature is assessed as one of the following:



Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.17 W/m ² K	Very Good
Roof	Average thermal transmittance 0.08 W/m ² K	Very Good
Floor	Average thermal transmittance 0.16 W/m ² K	Very Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, radiators, electric	Good
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system	Average
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 5.0 m ³ /h.m ² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 36 kilowatt hour (kWh) per square metre

Estimated CO₂ emissions of the dwelling





The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.7** per year

With the recommended measures the potential CO emissions could be: **0.4** per year

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling. To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed. Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating
Solar water heating	£89	 1	£89	 B 81
Photovoltaic	£306	 5	£395	 B 86

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£1191

Over a year you could save

£395

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details

Assessor name	Mrs. Nikki Kells
Assessor's accreditation number	
Email Address	

Accreditation scheme contact details

Accreditation scheme	
Telephone	
Email Address	

Assessment details

Related party disclosure	
Date of assessment	22/03/2024
Date of certificate	22/03/2024
Type of assessment	SAP, new dwelling